

OCT 15 1917

UNIV. OF MICHIGAN
LIBRARY



VOLUME XLIII
15

October 11, 1917

\$3.00 a year
10 Cents a Copy

Tarvia
*Preserves Roads
Prevents Dust*

Another Tarvia Town—GLENCOE

For several years the Business Manager of Glencoe, Ill., has been gradually converting the macadam roadways of that town into Tarvia roads to the great satisfaction of the taxpayers and residents.

Macadam roads that formerly have abraded rapidly into dust under the wear and tear of automobile traffic are now dustless and mudless at all seasons. They have become, in fact, one of the important attractions of this beautiful suburb.

Tarvia has been used primarily to preserve the roads, reduce the amount of reconstruction and

keep down maintenance expense—and this it has done most successfully.

The Business Manager, Mr. H. H. Sherer, wrote us on March 22nd, 1917:

"We have been able at a reasonable cost to forestall repaving in many cases and have given to the public, roads which are comfortable to travel over and which are peculiarly free from mud or dust."

We also have another and even stronger testimonial from Mr. Sherer, namely, an order for all his 1917 requirements, which shows a substantial increase over 1916.

Every year more and more towns find in Tarvia the solution of the good-road problem.

Illustrated booklet will be mailed free to any one interested.

Special Service Department

This company has a corps of trained engineers and chemists who have given years of study to modern road problems. The advice of these men may be had for the asking by any one interested.

If you will write to the nearest office regarding road problems and conditions in your vicinity, the matter will have prompt attention.

The **Barrett** Company

New York	Chicago	Philadelphia	Boston
St. Louis	Cleveland	Cincinnati	Pittsburgh
Detroit	Birmingham	Kansas City	Minneapolis
Nashville	Salt Lake City	Seattle	Peoria

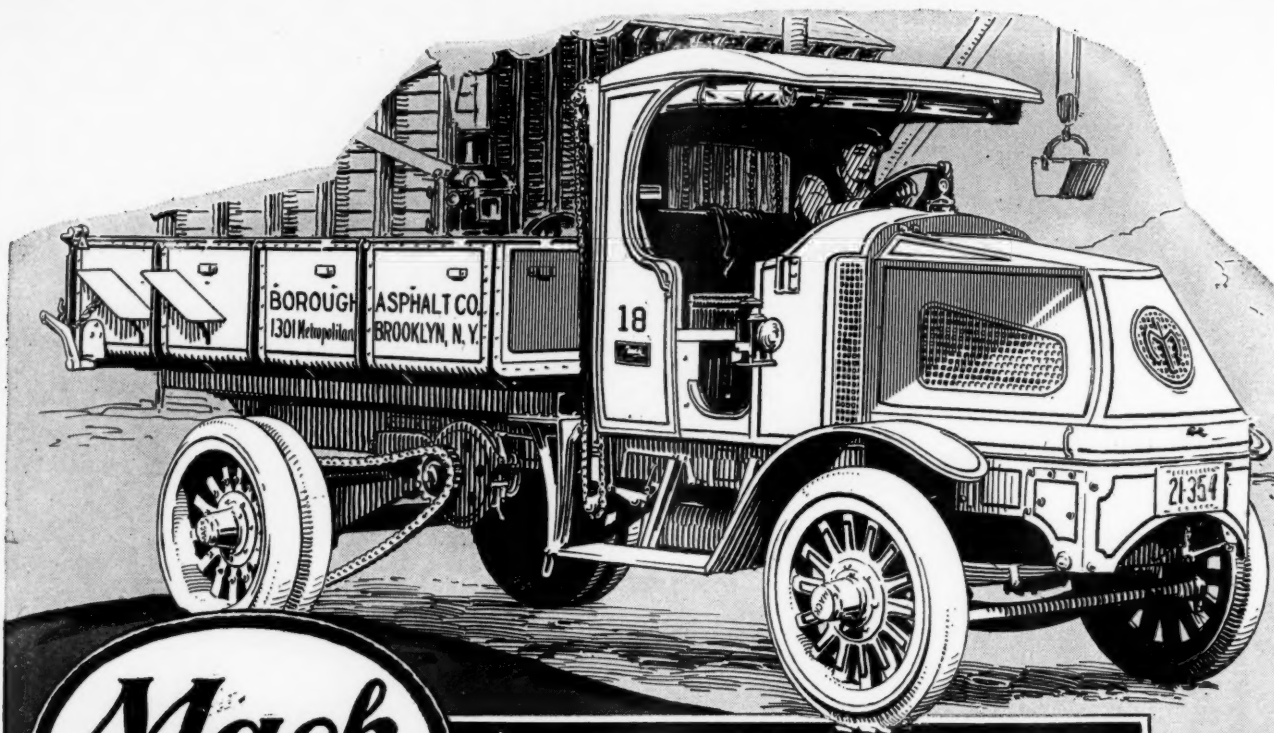
THE BARRETT COMPANY, Limited: Montreal
Toronto Winnipeg Vancouver St. John, N. B. Halifax, N. S. Sydney, N. S.



Scott Ave., Glencoe, Ill. Treated with "Tarvia-A" in 1912



Green Bay Road, Glencoe, Ill. Treated with "Tarvia-A" in 1915



Mack
TRUCKS

Making Short Hauls Pay

Quick unloading solves the short haul problem.

On jobs where ordinary trucks would be unprofitable, MACK trucks equipped with hydraulic hoists have proved to be money-makers.

The body is elevated to an angle of 50°. At this pitch a load slides off easily whether it be sand, crushed stone, wet concrete or hot asphalt.

But of greater interest to contractors is the MACK truck's tremendous strength, its great brute power, its low cost of operation and upkeep and its long life.

MACK trucks were used by the builders of the great Roosevelt Dam. Also on the New York Subway, Croton Aqueduct and many another important engineering job.

Investigate the records of MACK trucks. Learn how they have cut hauling costs. We have facts and figures. Send for them.

1 to 7½ tons capacity; with trailers, to 15 tons. Bodies can be designed to meet special needs.

INTERNATIONAL MOTOR COMPANY
NEW YORK

Performance Counts.

Municipal Journal

Volume XLIII.

NEW YORK, OCTOBER 11, 1917

No. 15

LAYING STEEL WATER MAIN IN ST. LOUIS

Thirty-six Inch Pipe Line Delivering Direct From Pumping Station to Low Service Reservoir—Machinery Used for Excavating and Backfilling—Detailed Cost of Work—Machine Trenching at House Services.

By W. E. HARDENBURG.



BACK-FILLING MACHINE AT WORK IN ST. LOUIS.

The city of St. Louis has just installed the first large steel water main laid in the middle west. The chief factor in the decision of the Board of Public Service to use steel pipe was the cost, it having been estimated that \$40,000, in round figures, would be saved by using steel instead of cast iron.

The main, which is 26,670 ft. long, connects Compton Hill reservoir, in the south central part of the city, with Bissell's Point pumping station, on the Mississippi river at the northern outskirts of the city; the object being to insure a more certain and continuous supply to the reservoir.

The St. Louis distribution system is divided into a high service and low service, the pressures in which differ by from 20 to 40 pounds, according to the distances from their respective pumping stations. The low pressure system is supplied from the Bissell's Point pumping station and the high pressure from the Baden station, which is about three miles north of the Bissell's Point station. The two systems are interconnected at certain points, but the connecting links are closed by valves. By opening one or more of these valves, high pressure can be furnished to sections of the low pressure districts, and this has been done often in periods

of heavy consumption when the friction in the mains of the low service system reduced the pressure in certain parts of that district to an undesirably low point. This feeding of the low pressure from the high reduced the pressure in the latter system by an average of 30 lbs., but with the facilities then existing no other method of relief seemed possible.

During the day time the supply in the low service system came partly from the pumping station and partly from Compton Hill reservoir, and there were then points on several of the mains that drew equally from both, and it was at these points where the minimum pressure existed. As the consumption along each line varied from time to time these points of minimum pressure changed their location. There is, however, a section of the city south of the reservoir which received most, if not all, of its supply from the reservoir alone.

Although there were several lines connecting the pumping station and the reservoir, only one 36-inch main led directly between the two, and this was drawn upon by the mains of the distribution system and even this main failed to deliver any water into the reservoir during hours of high consumption. Also, the mains

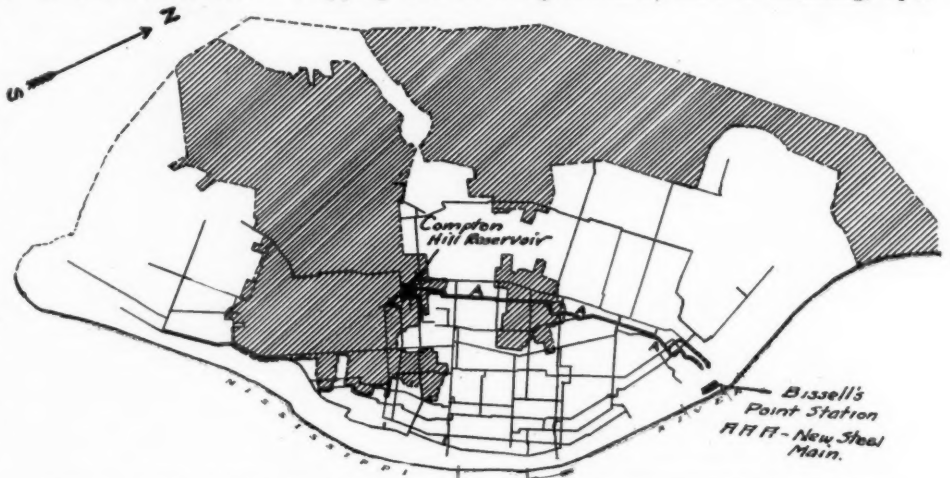
leading from the pumping station to and through the distribution system had not sufficient capacity and this necessitated too high pressure at the pumping station. To make possible the delivering of water into the reservoir and the operation of the pumps at lower pressure was the purpose of the pipe main referred to herein.

This main was laid along the most direct practicable route between the pumping station and the reservoir and is primarily a pumping main. It was constructed of lock-bar steel pipe supplied by the East Jersey Pipe Corporation, and was delivered in 30-ft. lengths, coated, and wrapped with burlap to protect the coating. Each length was subjected to a pressure of 300 lbs. to the square inch, made at the point of manufacture by the inspectors of the Board of Public Service. The maximum pressure that it was expected the pipe would be called upon to withstand was 125 lbs. per square inch.

The cost of the pipe alone was approximately \$7.20 per foot and that of pipe and appurtenances in place was \$9.80 per foot. The difference between the cost of steel and cast iron was about \$1.50 per foot, and it was believed that this saving in first cost out-balanced the advantage of the longer anticipated life of cast iron pipe.

The contract for laying the pipe was awarded to the Inland Construction Co. of St. Louis, and work was commenced in August of last year at Bissell's Point and

carried continuously south to the reservoir. The contractors' equipment included a No. 3 Austin trenching machine; a Curtis two-cylinder, single-acting air compressor driven by a 30 h. p. Foos gas engine (10½ by 18 inches), with a capacity of 200 cu. ft.; an air reservoir consisting of a steel tank 6 ft. by 30in. in diameter; a Novo back-filler driven by a 10h. p. one-cylinder gas engine, and small appliances, including No. 80 Boyer riveting hammers and a number 2X round Keller chipping and caulking hammer, used in caulking, oper-



MAP OF ST. LOUIS, SHOWING HIGH AND LOW PRESSURE DISTRICTS.

High pressure districts are shaded; low pressure, unshaded. Lines show mains 20-inch and larger supplying low pressure district.

ating at an air pressure of about 90 lbs. A portable blacksmith's shop and office were maintained on the work. A 3-legged derrick of the form employed in laying cast iron pipe was used in laying the steel pipe.

The soil formation encountered was mostly clay, and in this material rapid progress was made. The trenching machine excavated 20,160 lineal ft. of trench, or approximately 28,500 cu. yds. in 596 hours, an average of 34 ft. per hour. The nature of the soil in which the machine operated did not vary enough to produce any appreciable difference in the rate of excavation. In operating the machine there were employed 1 superintendent, 1 fireman, 1 engineer and 4 laborers. An additional crew of about 35 laborers was used in removing the top pavement, including brick, granite and concrete, in advance of actual machine operations, and 4 teams were used to remove the surplus excavation. The total cost was as follows.

Machine Crew:

Superintendent, 28 weeks at.....	\$30.00	
Fireman, 28 weeks at.....	15.00	
Engineer, 28 weeks at.....	24.00	\$1,932.00
Common labor, 3,883 hours at.....	.33 1-3.....	1,294.33
Auto trucks (hauling surplus dirt),		
740 hours at.....	2.00	1,480.00
Team, 2,177 hours at.....	.56	1,219.12
Total		\$5,925.45

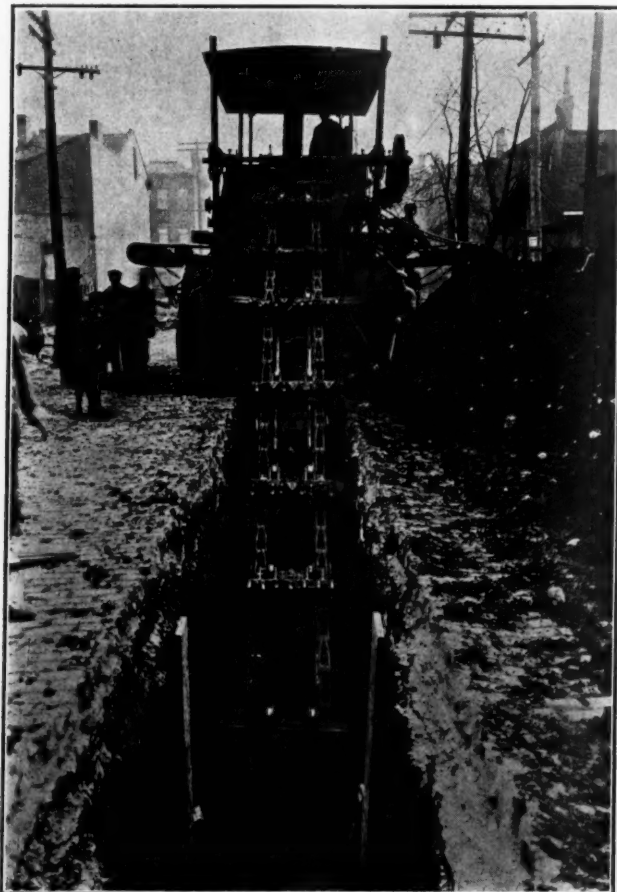
This gives an average cost per yard of excavation of 20.7c.

No separate account was kept of the back-filling, but this and the bell hole digging, tunnelling and hand excavation were all included together under the head of hand work, which totaled as follows:

Foreman, 4,784 hours at.....	\$.56	\$2,739.04
Common labor, 102,114 hours at.....	.33 1-3.....	34,038.00
Water boy, 1,818 hours at.....	.14	254.52
Back-filling engineer, 786 hours at.	.40	314.40
Teams, 2,722 hours at.....	.56	1,524.32
Auto trucks, 129 hours at.....	2.00	258.00

Total \$39,128.28

This hand work included 6,647 lineal ft. of trench, or

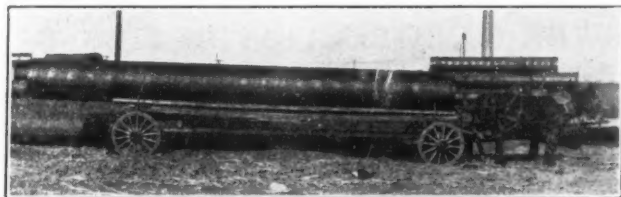


EXCAVATING TRENCH FOR 36-INCH PIPE.

approximately 11,700 cu. yds. of clay excavation removed by hand.

The back-filling was done partly by means of a Novo back-filler, the crew consisting of one engineer to operate the machine and two laborers to hold the back-filling slip. Digging for water and gas service connections was done by hand. A cross trench was dug at each service and it was cut and removed until the trenching machine had passed, when it was reconnected. A small amount of rock was encountered and here the usual slow process of drilling and blasting was employed.

The greatest difficulties were encountered in streets where other pipe lines already existed. In many places stretches of sewer, water or gas pipes had to be removed and relaid to make room for the new main; in other places the alignment or grade of the steel pipe was altered. The pipe was laid at a depth ranging from 7 to 12 ft., the general average being about 9½ ft. In connecting up the lengths of pipe, 47,900 rivets were driven, 2,000 seams were caulked and 1,044 joints were



30-FOOT LENGTH OF 36-INCH STEEL PIPE LOADED FOR DELIVERY FOR ST. LOUIS PIPE LINE.

riveted. The bends in the line were made with special riveted sections, usually such as to require but one field joint. The plates for the straight pipe were 5/16-inch thick, while those for the riveted bends were 7/16-inch. After riveting, the ends of the plates were caulked and the joints thoroughly cleaned both inside and out, and given a thick application of a protecting material known as Sarco and the outside of the joint was then covered with burlap. Connected to the main were 17 fire hydrants, 18 blow-offs, 23 manholes and 14 36-inch flanged valves with by-passes. These valves were spaced at approximately equal intervals along the line, and the section between each two successive valves was tested for leaks before it was back-filled. A connection was made between this line and the high service pumps so that, by opening or closing two valves, the line may receive water from either high pressure or low pressure pumping station. Eight air and vacuum valves, ranging in size from 4 to 8 inches, were set at the high points of the line.

The contract was to have been finished in May of this year, but was not completed until July, the delay being due chiefly to failure to complete at the time intended certain repairs that were being made to the reservoir. (See Municipal Journal for Sept. 6th.) F. L. Bock, assistant engineer of the Distribution Section, was in general charge of the work, under the direction of Edward E. Wall, water commissioner.

FRUIT TREES FOR SHADING HIGHWAYS.

State Highway Commissioner J. Deny O'Neil of Pennsylvania has instructed the various county engineers and superintendents of highways to endeavor to interest residents along the various state roads in the planting of trees along the roads. His idea is not only to add to the pleasure of using the roads, but also to make the trees serve a utilitarian purpose, as is done in some European countries, by planting trees that are fruit or nut bearers. His first choice would be oxheart cherries,

which he says are highly ornamental and will grow to large size but will not give a shade so dense as to keep the sun from drying up muddy roads. His next choice would be the apple tree. If purely shade trees are used, he advises the sugar maple or red oak.

These trees, he said, should be planted not more than a foot outside the fence line, in order that the roads may be widened later without destroying the trees; this being especially important at curves, which the state expects in the near future to make wider than the rest of the road.

SHEET ASPHALT ON COUNTRY ROADS

The First Sheet Asphalt Road Constructed by a County In New Jersey—Telford Macadam Base Removed and Concrete Base Laid.

Work is now progressing on the construction of 16,100 ft. of sheet asphalt surface on a concrete base on the Camden-Moorestown pike, N. J. This is believed to be the first sheet asphalt road constructed by a county in New Jersey. It is being laid by Burlington County on a road which carries fast and heavy motor traffic, but not much steel-tired traffic. The specifications call for a 1½-inch wearing surface of sheet asphalt on a binder course 1 inch thick and a 5½-inch concrete base mixed 1:2:4.

The contractors on the work, Sutton & Corson of Ocean City, N. J., are experiencing the usual troubles that are bothering contractors this year—difficulty in getting men, even at an exorbitant price, and trouble and delay in the delivery of material. The restricted space in which the work is being carried on—an electric railway track is laid on each side of the road—makes the use of hand labor necessary to a large extent, while work is sometimes delayed because of the necessity of maintaining railway traffic. Short hauls make the use of motor trucks costly, so teams are used on all transport work. Poor siding and unloading facilities are another factor. Sand is now being unloaded by hand, but it is hoped to take advantage of a coal elevator later on.

The old road is constructed with a telford base of coursed trap blocks, about the size and shape of Belgian blocks, which were laid about 40 years ago by a turnpike company. These are very firmly set and the problem of removing them has not yet been satisfactorily solved. On top of this foundation course is a wearing surface of waterbound macadam, which, though badly rutted and worn, must be removed before the blocks can be reached. Under the blocks is a loose loam, easy to handle.

Several methods are being tried for removing the blocks. A rooter plow, drawn by a steam roller, has oper-



MAKING A 6-INCH CUT AFTER REMOVING TELFORD BLOCKS.

ated fairly well and by this method the macadam top is removed at the same operation. The roter plow loosens the blocks so that they can be loaded by hand into wagons and leaves the road loosened so that excavation to grade is easy. Owing to the severe character of this work, delays due to breakage are rather frequent. Removing the blocks with bars and picks would be slow and costly and has not been tried. Recently a Keystone excavator has been tried on this work, but sufficient data have not yet been secured to determine whether or not it will operate successfully. A slat bottom has been placed on the bucket, the idea being that the blocks will be retained on the slats, but that the earth and the old macadam stone will fall through, allowing the blocks to be torn up and loaded into the wagons at one operation.

After the blocks have been removed, it is necessary to excavate the road only slightly to bring it to grade, the amount varying from 2 to 10 inches. This work is done by the Keystone excavator, except where the cut has been the least, where hand labor has been used. An average day's run is 300 feet of road, 20 ft. wide between the car tracks, and with an average cut of 6 inches. This totals about 110 cu. yds. a day. The county pays for excavation to within 18 inches of the tracks, but by agreement with the railway company, which is improving the tracks and bringing them to the new grade, the contractor excavates from rail to rail.

Provision for railway traffic (all other traffic is detoured) and the projecting ends of the ties delay the grading work somewhat, but a $1\frac{1}{2}$ -yd. wagon is loaded in $2\frac{1}{2}$ minutes. Owing to the shallow grading, the excavator is moved forward twice for every three wagons loaded. This and the usual delays cut into the speed so that not more than 10 or 12 wagons are loaded per hour. The contractor has been able to find suitable dumps near at hand so that long hauls have not been necessary. Three teams usually handle the output of the excavator. Two men, in addition to the engineer and fireman, are employed around the excavator. Nine men compose the fine grading gang and bring the sub-grade to the proper section and elevation.

The old trap blocks are excellent for concrete aggregate when crushed. An Acme crusher has been set up at a central location and the blocks are hauled to this and crushed. This allows an extra economy, as the wagons hauling blocks to the crusher carry back crushed stone for the concrete base. Sand is shipped from Absecon for the concrete base and both sand and coarse aggregate will be shipped in for the asphalt. At present the sand is shoveled from the cars by hand.

A Koehring concrete mixer is used for laying the base, which is mixed 1:2:4, using Hercules cement. The average gang at the mixer is 18 men distributed as follows: 4 men on concrete; an engineer, a fireman, 3 men on sand, 6 men on stone, one man on forms, a foreman and a general utility man.

Work has not yet been started on the bituminous

part of the contract and probably will not be begun for some time. A railroad mixing plant will probably be brought to the siding for furnishing the "hot stuff," which will be hauled to the job by teams. The base is to be $5\frac{1}{2}$ inches thick, the binder course 1 inch and the wearing surface $1\frac{1}{2}$ inches. The average mixture specified for the job is as follows:

	Bottom.		Top.	
	Min.	Max.	Min.	Max.
$1\frac{1}{4}$ — $\frac{1}{2}$	50	80
$\frac{1}{2}$ — $\frac{3}{4}$	0	10
$\frac{3}{4}$ —10	15
10—30	3	10	10	25
30—80	8	15	40	75
80—200	3	10	15	30
Over 200	2	6	13	20
Total stone retained on 10 mesh	70	80	0	0
Bitumen Content	4	8	10	12.5

The work is being done by Sutton & Corson of Ocean City, N. J., for Burlington County, under the direction of James Logan, county engineer. E. A. Fenton, superintendent for the contractors, is in charge of the work.

SEWER CONSTRUCTION IN CHICAGO*

Contractor's Methods Employed in Laying Six by Nine-Foot to Nine-Inch Sewers, a Considerable Part in Tunnel—Cost Details.

By H. R. ABBOTT†

To properly care for the sewage flow from the north portion of the Sanitary District of Chicago, intercepting sewers totaling 18 miles in length have been built or are now under construction. These sewers, which vary in size from 72 x 108-inch egg-shaped to 24-inch circular, collect the sewage from the many laterals and transport it into the North Shore channel, $8\frac{1}{8}$ miles long, which in turn empties into the North branch of the Chicago river. The North Shore intercepting sewer was completed in 1916 and the Evanston sewer is now under construction.

Preliminary work was done in 1913 on the North Shore sewer, transit surveys being run to cover the proposed route. Later, level lines were run and bench marks established. Borings were made at $\frac{1}{4}$ -mile spacings along the route and the work divided into three contracts, 2.7, 1.3 and 4.7 miles in length respectively. On the first two contracts, alternate bids were taken on concrete, brick, and segmental concrete blocks, reinforced, the bids for brick running 10 per cent and those for segmental concrete blocks 20 per cent over the monolithic concrete.

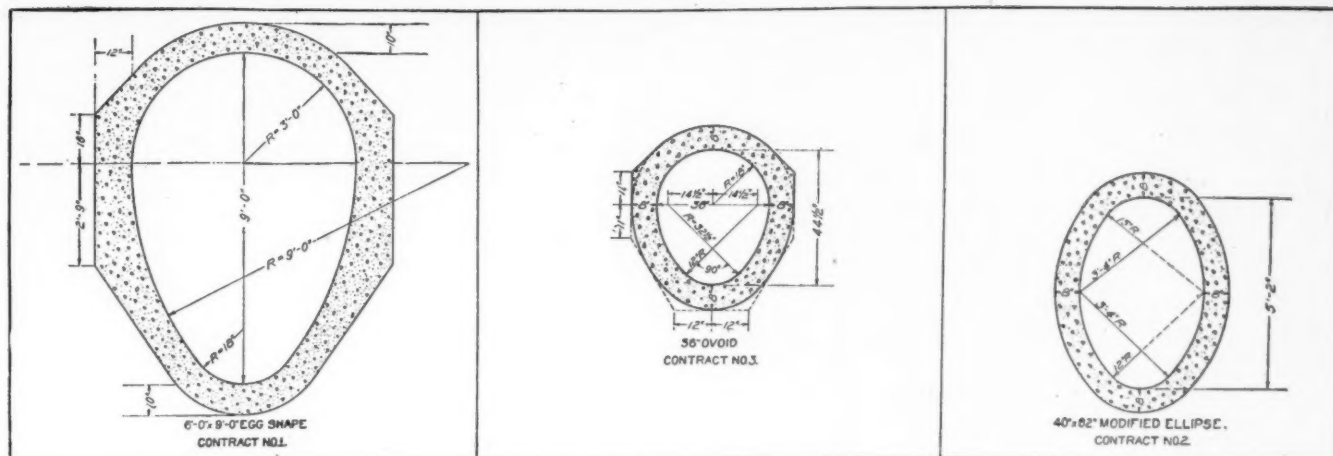
Contract two, 1.3 miles in length, was mostly in tunnel. Contract No. 1 was built entirely in open cut averaging $21\frac{1}{2}$ ft. in depth. The excavation was made by a Bucyrus 70-ton steam shovel, mounted on 16 x 16 timbers resting on house rollers across the trench and equipped with a 54-ft. dipper handle. In the maximum cut of 26 ft., some hand work was necessary on account of the great depth. The average daily progress for the entire working season was 70 ft., or 480 cu. yds. of excavation. The maximum daily run was 125 ft., or 850 cu. yds. All sheeting was left in place to protect local sewer and water pipes, though the entire cut was in stiff blue clay.

The section of sewer on this contract is monolithic concrete mixed 1:2½:5, and is 6 x 9 ft. in size, egg-shaped, changing to a 6 x 8-ft. section; the slopes are 1:2,000 and 1:2,500. Blaw steel forms of a collapsible



FINE GRADING GANG, FOLLOWING EXCAVATOR.

*Condensed from a paper before the Western Society of Engineers.
†Assistant Engineer, Sanitary District of Chicago.



TYPICAL SECTIONS OF NORTH SHORE SEWER, CHICAGO.

type were used, the sections being five feet in length. Both invert and arch forms were carried ahead by travelers, the arch traveler being 12 ft. long and carrying 15 ft. of form per trip. It ran on 9-inch wheels, supported on a small T rail placed on cross timbers about 3 ft. above the invert. The invert traveler carried one 5 ft. length of form on each trip. The invert form was suspended from a small boom, the rear end of the traveler being counterweighted to maintain stability. For this job 130 ft. of invert and 200 ft. of arch form were used. The invert form was supported at 5 ft. intervals by concrete blocks cast and cured outside the trench and placed to line and grade as soon as the bottom of the trench was shaped up, after which the space between the blocks was filled with concrete placed through a flexible jointed tube from a mixer placed to span the trench.

All material was teamed to the work, the average haul being $1\frac{1}{4}$ miles. Spoil was loaded direct from the shovel into $2\frac{1}{2}$ -yd. dump cars, which were hauled away in trains of seven cars each. An output of 0.8 ft. of complete sewer per man per day was obtained. This is very satisfactory progress for a sewer of this size and depth.

Contract No. 2, comprises a modified ellipse sewer, 40 x 62 inches in size, built partly in open cut and partly in tunnel. The slope is 1:1,250. On the open cut sections, a Parsons excavating machine was used, the excavated material being deposited along the trench. As the work was in unpaved streets, continuous sheeting was not used, and several cave-ins occurred. These were due chiefly to leakage from an existing tile sewer which paralleled the trench nearby.

Blaw forms were used on this work also. The sections were 5 ft. long and five lengths were bolted together as one unit when moving ahead. The invert was laid first, and the invert forms were then dragged ahead by block and tackle. The arch forms were equipped with 5-inch caster wheels and were carried on wooden stringers supported on cross beams. Collapsing was done by means of a turnbuckle, which also acted as a cross-brace. Fifty feet of invert and the same amount of arch forms were used on this job.

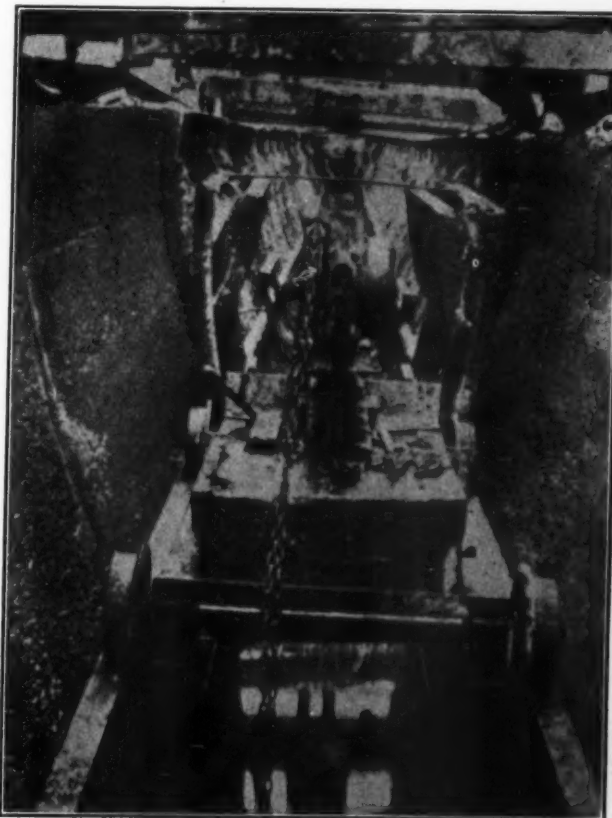
Concrete was mixed in a 10-ft. Whirlpool mixer, driven by a gasoline engine and chuted into the forms. Very little excavated material was hauled away and back-filling was done by teams. Progress on this section was very slow owing to the many construction difficulties. The output was only 0.66 ft. per man per day, a daily average of 25 ft.

The westerly part of this contract for about 3,700 ft.

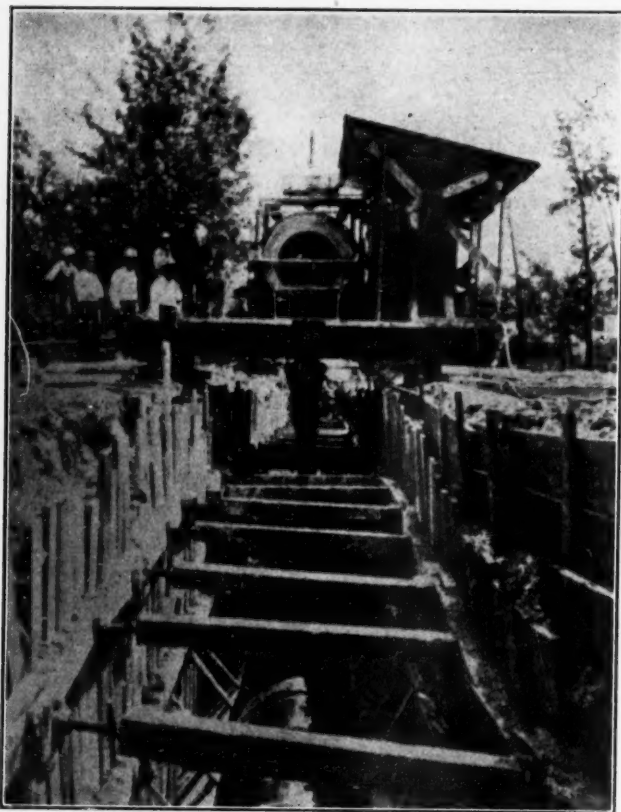
was built in tunnel. Three shafts were sunk, rectangular and about 6 x 8 ft. in size. In sinking these shafts, the material was scaffolded up.

The headings varied from 600 to 900 ft. in length. Work in the headings was carried on by three shifts during the entire 24 hours. Very little timbering was necessary, owing to the nature of the ground, but some crutches and roofing boards were needed. A regular mining program was followed, two shifts in each heading doing the driving, making about 10 ft. each, and the third shift concreting this 20 ft. mined each day. Thus a total progress of 40 ft. in the two headings per 24 hours was attained. This is equivalent to 0.75 ft. per man per day and is good progress for tunnel work of this size.

Concrete for lining the tunnel was mixed by hand at the top of the shaft, loaded into muck cars and pushed by hand to the headings. A strongly timbered two-



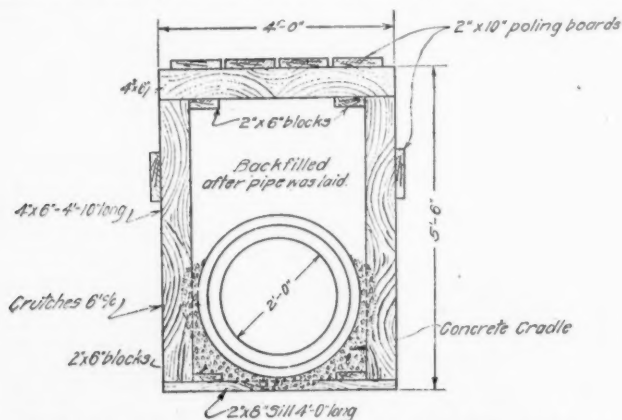
TRAVELER WITH BOOM FOR CARRYING INVERT FORMS AHEAD IN 5-FOOT SECTIONS.



CONCRETE MIXER ASTRIDE TRENCH, MAKING
6 FT. BY 9 IN. SEWER.

story head house carried the elevator, which was operated by a steam hoist. The muck was raised to the second landing and run out on a dump track for dumping on a muck pile or into wagons. At the completion of the tunnel work at one shaft, the head-house, hoist and boiler were moved to the next shaft. Ventilation for the tunnel was furnished by blowers belt-driven from a special engine. The Blaw forms for this tunnel section were the ordinary knock-down forms consisting of ribs and lagging plates, the plates being 5 ft. long and 18 or 21 inches in width. On this section, 80 lineal ft. of forms were used.

Contract No. 3 extended along the edge of the Skokie marsh through private property, about $3\frac{1}{2}$ miles being built on easements from private owners. The contract included 36, 33 and 30-inch ovoid-shaped concrete and 24, 18, 12 and 9-inch tile sewers, beginning with a slope of 1 in 1,500 and increasing to a slope of 1 in 540. This contract was specified to be built in open cut, except for



TIMBERING METHOD ON 24-INCH PIPE SEWER IN
TUNNEL.

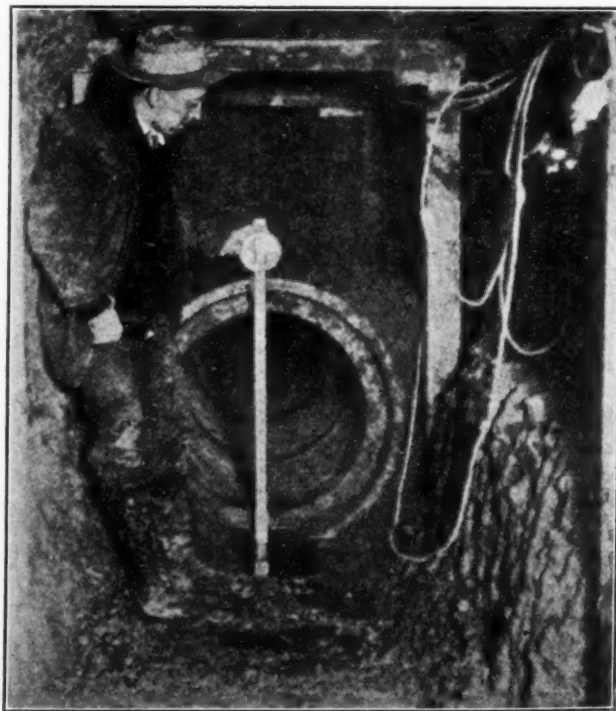
4,200 ft. of 24-inch tile. The contractor, after building the first 1,100 ft. in open cut and making unsatisfactory progress, decided to make all the balance in tunnel. The open cut work showed that the tunnel would be in fairly good clay; although the first six feet below the ground level was a very sandy loam and gave trouble in open cut, unless sheeting were used.

Shafts were sunk at short intervals for the entire balance of the tunnel. The headings averaged 207 ft. in length on the 36, 33, 30 and 18-inch sections, but not on the 24-inch tile sections. The total length of the shafts was 1,943 ft., or about 10 per cent of the entire tunnel built from these shafts. An average day's progress on this work was 57 ft., including the shaft work, or nearly one foot per man per day, as against 25 ft. per day on the 1,100 ft. done by open cut.

Owing to the extremely small working space on these sections, it was impossible to concrete the sewer as the work progressed. The expedient was therefore adopted of mining continuously between shafts and concreting the whole length of the heading from the face back to the shaft after the mining had been completed.

The shafts, averaging only 21 feet in depth, were circular, 6 ft. in diameter, lined with ordinary sewer rings and wooden lagging. They were sunk by two special crews, the first excavating and sheeting the shaft to a depth of 10 ft. and scaffolding out the material. The second gang completed the shaft and usually cut and timbered the eyes. Material was hoisted out with a carriage wheel winch, geared up to give more than usual speed.

Because of the frequent shifting, little plant was used. Two light, two-story timbered head-houses, built on skids, were used, one being in operation at the shaft where mining was under way, while the other was set up at the shaft ahead. The power plant was a single-drum hoist and a portable 30 h. p. boiler. The whole outfit was moved ahead, set up and put in operation in less than two hours.



GIVING GRADE FOR 24-INCH VITRIFIED SEWER IN
TUNNEL, CONTRACT NO. 3.

NORTH SHORE INTERCEPTING SEWER
COMPLETED JANUARY 1916
GENERAL INFORMATION

Item	Size	Shape	Average depth	Length	Contract Price	Method used	Contract Number	Location	Contractor
I	6'0"x9'0"	Egg	21.5	10080	1500	Open Cut	1	Sheridan Rd.	H.J.M. Nichols Co.
	6'0"x8'0"		21.5	4280	1450	Open Cut	1	"	
II	40"x62"	Egg	20.5	2940	810	Open Cut	2	Winnelka Ave.	Marquette Construction Co.
III	40"x62"		32.8	3630	1615	Tunnel	2	"	
IV	36"		26.2	1112	1100	Open Cut	3	Skokie Line	
V	36"	Oval	23.6	2431	1100	Tunnel by Option of Contractor	3	"	Nash Bros.
	33"		20.2	8272	915		3	"	
	30"		20.5	6423	685		3	"	
VI	24"	Circular Tile	47.7	4195	1000	Tunnel by Option of Contractor	3	Milton Ave.	
	18"		23.5	2398	670		3	and other	
	12"		17.6	476	375		3	Streets	
	9"		20.0	123	380		3	in Glencoe	
				46340					

Note: All sewers over 24" in diameter built of monolithic concrete, 24" and under built of vitrified tile laid in concrete cradle.

Cost of Materials			Cost of Blaw Steel Forms per foot of sewer	
Kind	Items	Items	Contract No.	
Cement	*1.19 per bbl.	*1.25 per bbl.	1	Open cut - 20¢ per ft.
Sand	*1.65 per cu yd.	*1.70 per cu yd.	2	Open cut - 18¢ per ft.
Gravel	*1.65 - - -	*1.70 - - -	2	Tunnel - 21¢ per ft.
Lumber	*22.00 per M.	*26.00 per M.	3	Tunnel - 18¢ per ft.
Coal	*5.50 per ton	*4.00 per ton		
24" Tile Pipe		90¢ per ft.		

COST ANALYSIS-PER FOOT

ITEM NO. I	ITEM NO. II	ITEM NO. III
Contract No. 1	Contract No. 2	Contract No. 2
Size 6'0" x 9'0"	Size 40" x 62"	Size 40" x 62"
Open Cut - Average depth 21.5 ft.	Open Cut - Average depth 20.5 ft.	Tunnel - Average depth 32.8 ft.
Excavation per foot 6.6 cubic yards	Excavation per foot 3.1 cubic yards	Excavation per foot 1 cubic yard
Concrete per foot 0.95	Concrete per foot 0.4	Concrete per foot 0.4
Waste per foot 2.2	Waste per foot 1.0	Waste per foot 1.0
Backfill per foot 4.6	Backfill per foot 2.1	Backfill per foot 1.0
CONCRETE	MIXTURE	1-2 1/2-5
STIFF	BLUE	CLAY
ITEM NO. IV	ITEM NO. V	ITEM NO. VI
Contract No. 3	Contract No. 3	Contract No. 3
Size 36"	Size 36" x 33" x 30"	Size 24"
Open Cut - Average depth 26.2 ft.	Tunnel - Average depth 21.4 ft.	Tunnel - Average depth 47.7 ft.
Excavation per foot 6.0 cubic yards	Excavation per foot 0.8 cubic yards	Excavation per foot 0.85 cubic yards
Concrete per foot 0.45	Concrete per foot 0.4	Concrete per foot 0.1 cubic yards
Waste per foot 6.0	Waste per foot 0.8	Waste per foot 0.48
Backfill per foot 0.37	Backfill per foot 0.37	Backfill per foot 0.37
CONCRETE	MIXTURE	1-2-4
STIFF BLUE CLAY	STIFF BLUE CLAY	STIFF BLUE CLAY
Ground of grade line of sewer is fairly stiff blue clay with occasional sand-pockets of considerable extent. First 6 ft. below ground surface consists of soft sandy clay.		
Sinking 6' x 8' shafts on Item VI, 194 lin ft cost \$600 per foot or \$127 per cu yd including timbering. Deep Manholes 3'0" dia cost \$450 per lin ft including excavation, logging and concrete.		

* Lengths aggregating 725 feet done by open cut method on account of sand pockets.

Muck was brought from the heading to the shaft in tubs carried on small flat cars. No elevator was used, the tubs being hooked directly onto the hoisting cable, raised to the second landing of the head-house, and dumped into spoil wagons. Concrete was mixed in a Whirlpool mixer of ten cubic feet capacity and chuted down the shaft into dump cars which were pushed to the headings. Forms were removed by a special gang after the concrete and mining gangs had gone on to the next shaft. This gang also pointed up, plastered the invert and concreted up the opening at the shafts. The forms used in concreting the shaft had to be removed through the next shaft.

Sand pockets of considerable extent along a stretch of 3/4 mile prevented the work being done in tunnel at these places with the means at hand. These sections were constructed by the open cut method, making the excavation by hand, the open cutting in eight such sections totaling 723 ft. This open cutting was very expensive for the contractor.

Built-up wooden forms were used on the 30 and 33-inch sections and Blaw steel forms on the 36-inch section, using 128 ft. of each kind. All material was delivered by team and for about one-half the contract it was necessary to lay plank roadways extending from the end of the nearest paved street to the work. This planking was taken up and used again and again. The average haul for material was 1 1/2 miles.

The 24-inch pipe section was specified as tunnel in the contract. It was driven from four shafts averaging 49 ft. in depth, spaced about 1,000 feet apart, making the headings 500 feet long. All shafts were sunk at manhole sites and other manholes were built in specially excavated wells between the shafts. These shafts were similar to those described on contract No. 2. Excavated material was scaffolded out to a depth of 12 feet, after which a windlass mounted on a tripod hoisted out material in buckets. Excavation for the intermediate manholes was made in circular wells 4 feet 8 inches in diameter, sheeted with 2-inch lumber held in place by steel rings and the material hauled out by a windlass. No trouble was encountered in sinking these wells to a depth of 60 feet.

From the shafts, the mining was carried on continuously for the full length of the heading, the tunnel being timbered as the work advanced and track laid. Muck cars of half-yard capacity were used for transporting material. These were hoisted to the second landing of the head-house and the muck dumped into wagons.

As soon as the headings were completed, the pipe was laid in a concrete cradle, beginning at the far end of the heading and working toward the shaft. Pipes were brought in, one at a time, on the dump cars, the sides of which were removed. All joints were calked with jute soaked in cement grout, and plastered. The backfill was brought down the shaft in muck cars and packed over the pipes, the usual proceeding being to lay about four lengths of pipe and then backfill. The tunnel was about 4 or 4 1/4 x 4 1/2.

A more permanent plant was used on this job. The head-house was a heavily timbered two-story structure, with a 6-ft. cage elevator. A dump track was laid out on a dumping trestle under which wagons could drive. No compressed air was used, but a small blower furnished air for ventilation. At the completion of work at one shaft, the boiler, hoist and head-

house, all mounted on skids, were moved by teams with block and tackle to the next shaft. Two days were required to move and reassemble the plant.

EXCLUDING GASOLINE FROM SEWERS.

An ordinance of the city of New York requires every garage where more than four motor vehicles are stored to install an oil separator or some similar device and that this be emptied and cleaned at frequent intervals; the object being to prevent gasoline from reaching the sewers, it having been determined with considerable certainty that such gasoline has been responsible for numerous explosions in sewers. Recently the Board of Aldermen of that city passed an ordinance repealing the ordinance requiring separators, but this was vetoed by the mayor and his veto was sustained a few days ago by a vote of 24 to 9.

In transmitting his veto, mayor Mitchell stated that he had asked the sewer bureau and the fire department to report upon the question, and that both had vigorously opposed the repeal of the ordinance. The chief engineer of sewers stated that for three years up to the present summer there has been much less difficulty than formerly and practically no explosions have occurred, principally owing to the precautions required by the ordinance. In June of this year, however, an explosion occurred in East 42nd Street, in which manhole covers were blown into the air. On July 23rd an explosion occurred in West 23rd Street, at the river front, in which 12 manhole covers were blown into the air and a number of people injured. The explosion was near the wooden sewer which served as the outlet under the dock, and this was found to be on fire, and had to be partially destroyed before the fire department could get control of the flames. The garage of the Adams Express Co. in 10th Ave. was suspected of being one of the chief sources of the gasoline that caused this explosion. In addition to these explosions, a number of workmen had been made ill by the gas fumes while in the sewers.

The mayor said in his veto that it is possible that oil separators can be dispensed with in outlying sections of the city, but that the safety of the sewer operators who are required to work daily in the sewers, as well as of the citizens in the streets, is endangered by gasoline in the heart of the city and is more important than the inconvenience and expense to garage owners of installing and maintaining the oil separators.

The ordinance requiring the separators has been declared constitutional by the Court of Appeals.

FEDERAL AID FOR PATENTED PAVEMENT.

In constructing the road from Little Rock to Camp Pike, the State Highway Commission of Arkansas selected Warrenite for the surface material. The cost of this road leading to the cantonment is estimated at \$125,398. The State Highway Department a few days ago stated that the Secretary of Agriculture had approved of this selection and that he had set aside \$52,398 in the U. S. Treasury with which to make partial payment of the cost.

The significance of the above lies in the fact that Warrenite is a patented pavement, and that there was considerable question a few months ago as to what stand the Secretary of Agriculture and the Office of Public Roads would take in connection with the use of patented materials and processes on roads, the con-

struction of which was to be paid for partly from the federal aid fund. (See Municipal Journal for February 22, 1917.) This is said to be the first contract let under the federal aid act in the state of Kansas.

HANDLING AGGREGATE FOR CONCRETE ROADS.

Within the past few months Municipal Journal has described several concrete road construction jobs where special methods have been used to reduce the labor required in handling the aggregate. Another piece of construction work where special equipment has reduced the number of men necessary to handle and transport the sand and stone for the concrete is a section of about 11½ miles in St. Joseph County, Ind. This pavement is 18 feet wide, 6 inches thick at the sides and 9 inches at the center. The contractor for this work is Jacob Ackerman & Co., of Laporte.

Prior to the award of this contract this company had concentrated on brick and macadam paving and consequently were without the special equipment necessary to handle economically a large concrete road contract. The total cost of the road was about \$175,000. To handle a job of this size required the purchase of a large amount of machinery, and a paving mixer, forms, 3 miles of Koppel industrial railway, a locomotive and 45 standard 1½-yard cars and the special equipment necessary for this type of work were bought.

Instead of following the standard practice in regard to loading the aggregate into the cars, hauling it to the road and dumping it there to be fed to the mixer by wheelbarrows, the contractors devised a method whereby it was possible to mix concrete without moving the material by hand. Gravel and sand were delivered by railroad to bins erected along the track, the aggregate being discharged by gravity from the cars into a chute, whence it was raised by an elevator and discharged into the bins.

From the bins, which hold about 35 yards each, the sand and gravel were loaded by gravity into the Koppel cars, 15 cubic feet of gravel and 9 cubic feet of sand—enough for one batch of concrete—being loaded into each car. On top of this sand and gravel was deposited six bags of cement. Fifteen cars, loaded in this way, made up a train. This train was hauled to the mixer, which was equipped with a skip working at right angles to the drum and long enough for the industrial side-dump cars to discharge directly into it. The mixer is a special machine built by the Marsh-Capron Manufacturing Co. It has a capacity of 36 cubic feet and, as stated above, has a specially designed skip. The concrete is mixed 1:1½:2½.

By handling the concrete material in this manner, a much smaller number of men is required to operate the mixer than would be the case if wheelbarrows were used to convey the sand and gravel to the mixer. No material is lost by scattering on the sub-grade, and there is no danger of getting earth mixed with the sand or stone. No cement pile is required with the attendant danger of waste by wetting, etc.

For grading, a Thew steam shovel with a 5½-yard dipper was used, especially on the heavier cuts. Teams were used for hauling, 35 being employed at times.

Driven wells furnish the water for mixing the concrete and curing the completed roads. Water is pumped by a 6-h. p. kerosene-driven engine through a 2-inch pipe line. The pipe line is provided with tees 150 feet apart for hose connections. The capacity of the water works system is about 18,000 gallons a day, and a pressure of 30 pounds is maintained, a pressure tank insuring a steady supply.

Municipal Journal

Published Weekly at
243 West 39th Street
by

Municipal Journal and Engineer, Inc.

S. W. HUME, President
J. T. MORRIS, Treas. and Mgr. A. PRESCOTT FOLWELL, Sec'y.

A. PRESCOTT FOLWELL, Editor
W. A. HARDENBERGH and SIMON BARR, Assistant Editors
CHARLES CARROLL BROWN, Western Editorial Representative

Telephone, 9591 Bryant, New York
Western Office, Monadnock Block, Chicago

Subscription Rates.

United States and possessions, Mexico and Cuba.....\$3.00 per year
All other countries..... 4.00 per year
Entered as second-class matter, January 3, 1906, at the Post Office at
New York, N. Y., under the Act of Congress of March 3, 1879.

Change of Address.

Subscribers are requested to notify us of changes of address, giving both old and new addresses.

Contributed Articles and Reports.

Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

City officials and civic organizations are particularly requested to send Municipal Journal regularly their annual and special reports.

Information Bureau.

Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

PLACING HOUSE CONNECTIONS AHEAD OF PAVING.

There are a number of arguments both for and against the practice (which a number of cities have adopted), before constructing a new pavement on any street, of laying house connections for every lot on such street from sewers, water and gas mains. The object is to prevent the necessity of afterward cutting openings in the proposed pavement for laying such connections, which cutting is both expensive and liable to cause a serious injury to the pavement. Against the practice it is argued that the capital represented by such services renders no return in the form of either interest or service—that many of such service pipes, in fact, will never be used; that water and gas services are apt to leak from corrosion or other cause and such leaks continue undiscovered for years; and that sewer connections admit ground water into the sewer through uncovered ends or leaky joints.

Most of these objectionable features can be eliminated by ordinary care in construction. But inspection of a recently constructed work of this kind has again impressed upon us the greater or less prevalence of carelessness in such work in other respects. The chief of these is in backfilling. The instance in question consisted of laying house connections along a mile of street which it is proposed to pave next year. No care whatever was taken in refilling the trenches, but the dirt was cast back loosely and a high mound now marks the site of each trench. As the soil is a clay, there is little possibility that the backfilling will settle compactly before next spring. (We have known trenches in such soil to

continue settling for ten years and more). Settling of the trench after the pavement has been laid is apt to defeat the very purpose of the construction, by necessitating the taking up and relaying of the pavement over such trenches when it shall have settled from lack of support.

Money spent to prevent the necessity of cutting into a pavement for laying connections is worse than wasted if the cuttings must be made for another purpose; and in most cases such worse-than-waste can be avoided only by properly compacting the backfilling. This may make the cost a little greater, but if such increase is necessary to give any value at all to the principal expenditure, there can be no question of its desirability.

Another point is the future finding of these connections. They are usually terminated at the curb, and when they are put into use must be continued from the curb to the building. In order that the curb end of the connection may be found years hence, such end should be located by careful reference measurements to some permanent point. Not only this, but it is very desirable to indicate the exact location by means of a durable monument of some kind; for mistakes may occasionally be made in the reference measurements, or the plumber or other who is endeavoring to locate the service may use an inaccurate tape. It is an excellent practice to bury an iron or copper rod in the ground, directly over the end of the pipe and with its upper end about at the ground surface. It will then be necessary only to scratch the surface with a hoe or shovel before digging to learn whether the surface has been correctly located by the measurement.

HIGH-COST PAVEMENTS FOR COUNTRY HIGHWAYS

Thirty or forty years ago nothing more durable or expensive than macadam was considered necessary for any streets except the main thoroughfares of the large cities. But with increasing traffic the realization was forced upon city and even village authorities that macadam should be extended to practically all the streets of a municipality, and some more durable material used upon the heavier-traffic streets. A few years later the use of macadam on main country highways was recognized as necessary and the more durable pavements were employed on increasing numbers of city streets.

The increase in number, weight, speed and mileage of vehicles increases, and the traffic burden on the main country roads is rapidly reaching the intensity found on city streets a few years ago. It is therefore only logical that more durable pavements should be adopted for such roads. It is not the location of a roadway, whether it is bordered with sidewalks, or what kind of governmental body has charge of it that should determine the kind of construction to be employed, but the service that the roadway is to perform. And that service is determined by the kind and amount of traffic to be carried.

It is therefore proper that many roads outside of city limits and not bordered by houses should be paved with sheet asphalt (as described in this issue), brick, stone block, or whatever other pavement may be most suitable to the traffic and ultimately most economical, set upon a concrete base and constructed in every way as carefully as if on a city street. What pavement is most suitable and economical is determinable by the same considerations and calculations as in the case of city streets.

We would not wish to imply that all country roads should be given the most durable type of pavement. To do so would be out of the question financially, even in these days of five billion dollar bond loans; and it would be criminal waste of money, since in the case of the majority of roads a much smaller expenditure would give

a service to the light traffic they carry almost if not wholly as satisfactory as would the most expensive pavements.

But some country highways demand the highest type of pavement. The diversity of conditions as to traffic is greater on country highways than on city streets, and the mileage of such highways is enormously greater, and more care and expert judgment are needed, therefore, to decide just what routes should receive the most durable pavements and on what ones only a cheaper or even the cheapest construction is warranted. Such decision should be made by the best traffic paving experts obtainable; and since towns and small political units can hardly employ such, and since the selection of main routes is one that outreaches the boundaries of any one or two towns, such decision should be entrusted to state and national boards, which should refer it to the best talent that they can secure.

IMPROVING THE CURVES OF OHIO ROADS.

In reconstructing the main roads of Ohio, considerable attention has been paid by the engineers of the State Highway Department to improving the conditions on the curves. In the old days before automobiles were common, there was no need of building a road on a curve any differently from a straight road. With the present large number of automobiles a different construction is necessary. In the first place, the high speed of the automobile makes it very desirable to have the curves wider than the straight sections of the road. Some engineers have advocated widening the outside of the curve, but the Ohio engineers believe that the extra width should be added on the inside. A car moving on the inside of a curve naturally is driven along the side of the road. A car moving on the outside of the curve, on the other hand, is naturally driven near the center of the road, and if the road is widened on the outside of the curve the driver is forced against his natural inclination to turn out to the outer side, curving his car out somewhat when he enters the curve and bringing it back toward the center when he leaves it, assuming that he is careful enough to take this precaution for the sake of safety. By widening the curve on the inside, there is none of this necessity of departing from the natural inclination in driving.

Another feature of the improvement, which also is being carried out in most states, is to bank the road on the curves in such a way that the cross-section of the road slopes continuously upward from the inside to the outside instead of being crowned in the center. Observation of the use of the roads in Ohio has convinced the engineers that a slope of $\frac{1}{2}$ inch to the foot from the outer to the inner edge of the roadway is about the limit which it is easy for horses to travel on, and this slope has accordingly been adopted as the maximum which the cross-section of the road should have on curves. A car can run on a curve having a radius of 1,400 feet, when the cross-section is sloped in this way, at a speed of 30 miles an hour without causing the occupants any inconvenience. If the curve has a shorter radius, say 650 feet, the speed of the car must be reduced to about 20 miles an hour in order not to inconvenience the passengers, and if the radius is 300 feet the speed should be reduced to about 14 miles an hour in order to prevent the passengers being thrown toward the outside of the curve. A highway cannot have the curves banked sharply when the radius of curvature is small, as can be done on railways, because the sharp inclination in such a case would be altogether too great for the road to be passable with safety by

horse-drawn vehicles. The best that can be done is to bank the curves on a moderate slope and trust that drivers will have enough regard for their passengers to slow down when they are on sharp curves.

MAINTAINING MACADAM ROADS IN RICHMOND

How a Small City Maintains Macadam Streets by Surface Treatment With Oil and Keeping Up Small Repairs.

Richmond, Ind., is a small city, located in a limestone county, and has a large mileage of macadam streets, most of them built with broken stone but some of them with excellent gravel, which also is available. The street department long ago formed the habit of looking after the streets closely, and the city has been notable for the regular surfaces of these streets and the small proportion of rough and broken roadways.

Recently city engineer Fred Charles has put in practice a method of maintaining these streets which is greatly improving them and relieves the street department or the property owners of the heavy expense of street sprinkling to keep down the dust of the old macadam streets.

When an old gravel or broken stone street needs general repairs, the surface is scarified and brought to a uniform grade, crown and surface. It is then covered with 3 to 5 inches of broken stone of the usual size for surface layer, about 1 to $2\frac{1}{2}$ inches, and rolled into place, generally using stone dust as filler. This makes a good macadam surface, but it soon becomes dusty, whether it is thoroughly filled with stone dust or no stone dust is used.

The construction is made by day labor under the street commissioner, and exact accounts of the cost of each street are not kept. Careful estimates show that the cost varies from 35 to 50 cents a square yard, depending on the amount of work done, but largely on the length of haul of the stone.

Some months after the street is constructed, usually the first or second year following, it is treated with 40 per cent asphaltic oil, such as Standard Oil Company's No. 4. The amount of oil used varies according to condition of street and of the street repair funds. The best results are obtained by applying first one-third gallon of oil per square yard and following with a second treatment, using one-sixth gallon. Each coat of oil is covered with a coat of stone screenings from which the dust has been removed. The oiling cost is assessed on the property at about 10 cents a linear foot, which amounts to about 4 cents a square yard.

Many streets receive but one coat of oil, which seems to produce good results under proper conditions.

Concrete curb and gutter is in quite general use, and the streets are quite uniform in width, or at least in width of surface receiving treatment.

Streets which receive a treatment of the oil of about one-third gallon a square yard a year assume the general appearance of asphalt streets and show few broken or raveled spots. Where traffic is heavier than the average, the streets should have a treatment each year without reference to the uniformity in the good condition of the street, but the condition of the street repair fund does not always permit this, so that frequently a street is passed for a year. As a consequence, there is no street with an absolutely perfect surface throughout. The line of economy between perfection of appearance on the one side and too great deterioration and consequent high

cost of special repairs is quite closely drawn by the city's practice. A few notes of individual streets will illustrate this point.

Fourteenth street from Main to South A is a block of macadam built in 1907. It was first oiled in 1913 and has had four annual treatments, not receiving one in 1917. The surface has the general appearance of a sheet asphalt street and has no broken or raveled spots, except where the surface has been disturbed by cuts which were not properly refilled.

Thirteenth street was resurfaced with macadam in 1915, according to the method described above. It has received two coats, of one-third gallon each, of oil, one in 1916 and one in 1917. The surface is in good shape and has a uniform crown.

North Eleventh street was resurfaced with macadam in November, 1916. In the spring of 1917 it received two treatments, of one-third and one-sixth gallon, respectively. Some areas show slight raveling, especially on the steeper grades, and some holes are developing, so that another treatment will be required early next year, with some special filling of holes such as described below.

The block of Sixteenth street from A to B was resurfaced in 1916 with macadam in which no stone dust was used as filler. At the same time the street was oiled, and the oil was covered with sand instead of stone chips. While this street has a fair appearance, it is not wholly a success, owing doubtless to the use of light oil for the large voids in the stone, without filler.

The next block of this street was of the city's standard reconstruction, with macadam in 1915, oiled in 1916 but not in 1917. It is a good street for light traffic but shows the advisability of annual treatment, though not yet showing too great deterioration for economical treatment.

One long block of this street shows the effect of a number of defects in treatment. Part of the street is completely covered with the asphaltic surface, and part is much spotted. Some of this spotting is attributed to using the street too soon after oiling. One difficulty in the practical treatment of a street is to prevent too free flow of oil to the gutters, which it tends to do, partly because of the pronounced sideslopes which are necessary in crowning the streets to insure good drainage and that no water stands in spots on the surface. The attempt to keep oil out of the gutters on this street was overdone, and the treatment did not reach them; and horses standing along the gutter have disturbed the untreated surfaces occasionally. If the voids in the stone are not well filled with stone dust, the standard treatment is too thin, and it soon disappears. This street was oiled in halves, and the result is not as satisfactory as though the whole width of the street had been oiled at the same time. Variations in treatment do not seem to be so great when the whole street is treated at once as when it is treated up one side and down the other.

On account of the method of securing the reconstruction of streets and assessing the cost of oiling, much of the treatment is done in separate blocks at different times. This makes the cost slightly greater, and the variation in the appearance of adjoining blocks down a street is quite marked. Continuous work would be more satisfactory.

Numerous lightly traveled blocks of streets in the city are on rather steep grades, and the crowns are kept rather high, so that the water from the street surface runs down the concrete or brick gutter. These streets are macadamized and retain their surfaces satisfactorily, except along the gutters, where any water beyond the gutter capacity washes out the dust filler and leaves the

stone in a raveled condition. The use of oil on such streets keeps them in good condition, if the street can be filled quite to the gutter. A treatment of oil for a foot or two adjacent to the gutter may be all that is necessary to overcome this special condition.

Along the margins of hard pavements, where the crown may be flattened out, the oiled macadam wears much more rapidly than the rest of the street, and these narrow strips are repaired by mixing heated Tarvia X with the fine broken stone and tamping it in place. The same process is used in filling holes which have worn through the thickness of the macadam.

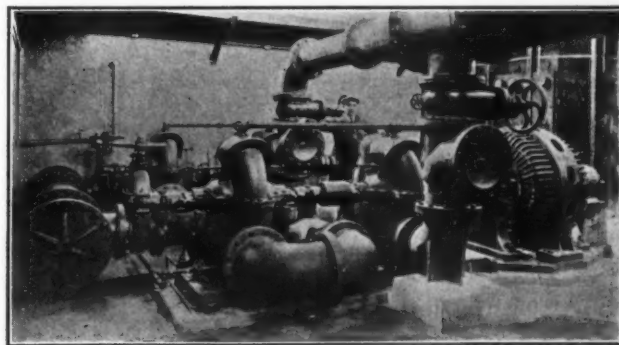
One interesting experience is that a softer Richville limestone, while it wears more rapidly, cements better and makes a street which wears more uniformly than the harder New Paris stone. This was shown clearly on one street where one kind of stone was laid on one side of the street car track and the other kind on the opposite side. Uniformity of wear makes the street made of the softer stone last as long as or longer than one in which the harder stone was used, the latter wearing into holes more quickly and requiring repair sooner.

CAMDEN'S ELECTRICALLY OPERATED PUMPS.

There has recently been put into service at Camden, N. J., a pumping installation consisting of two centrifugal pumps operated by electric current obtained from the Public Service Electric Company. It is located at the Del Air plant of the Camden water works, where the pumps are placed about 12 feet below the ground level in a pump well covered with a neat brick building.

The pumps are both 12-inch centrifugal, double-suction, single-stage with a combined capacity of 10,000,000 gallons per 24 hours against a pressure head of 150 feet. Each is connected through a horizontal shaft to a 200 h.p. synchronous motor, using current at 2,200 volts, at which voltage it is received from the power company. For lighting and for two 10 h.p. induction motors that operate rotary vacuum pumps this voltage is cut down to 220 by transformers.

The switchboard has three panels, one for each main pump motor with the necessary relays and switches, and an ammeter and reactive factor meter, and a metering panel carrying the central station's kilowatt-hour meter and curve-drawing wattmeter. A switch near each of the smaller pumps controls it.



CAMDEN PUMPING PLANT.

During a test run the pumps, with suction heads of 27.33 and 26.5 ft. respectively and operating against a pressure head of 150 ft. developed an over-all efficiency of a little under 72 per cent, or a current consumption of about 160 kw. The figure would have been somewhat better if the water had not contained some air.

The plant was furnished by the Camden Iron Works, all the electric equipment being manufactured by the Westinghouse Electric & Manufacturing Co.

The WEEK'S NEWS

State Highway Developments in Missouri, North Carolina and California—Infantile Paralysis in Chicago—Passaic Valley Sewer Costs Go Up—"Health Week" in Minneapolis—Buffalo's Hospitals Reorganized—More Wanaque Litigation—New York Aldermen Against Meters—Park Lighting in American Cities—Fort Worth's Police Chief Shot—Abolish Four Cent Fares in Seattle—Cleveland's Rapid Transit.

ROADS AND PAVEMENTS

Convicts for Missouri Roads.

Jefferson City, Mo.—Missouri's war programme includes the employment of five hundred convicts on road work and it is likely that the first road to be built will be the Columbia-Jefferson City highway to link the seat of the state university with the state capital. Plans for the construction of a permanent highway over this route have been considered for several years, but prison labor did not become available until this year with the abolition of the prison contracts. Since the beginning of the war, William R. Painter, chairman of the Missouri prison board, has been urging harder than ever the proper utilization of the labor of the 2,600 prisoners confined in the state institutions. The price to be paid for each convict used by the state highway department was not fixed until Governor Gardner suggested the compromise price of \$1.25, for which the state will feed, clothe, transport and guard the prisoners.

No State Road Aid in North Carolina.

Raleigh, N. C.—"State aid for highway building in North Carolina is in name only," according to a recent statement by Col. Bennehan Cameron, of Stagville, chairman pro tem of the state highway commission. Colonel Cameron declared the failure of the legislature to report the \$75,000 asked for to pay the cost of highway engineering in the state, in time for debate and passage in the last general assembly had placed the burden of support of the big work on the individual counties. W. S. Fallis, the state highway engineer, has also pointed out that the placing of the financial responsibility upon the counties is undesirable. The state of North Carolina can get a maximum of \$1,700,000 from the federal government for road building on condition that the state put up a similar amount. This would mean the expenditure in the next four years of \$3,400,000 on road building in the state under this special provision, but when the state government failed to take any part in furnishing the money for its half, the counties had to get what amount they could by raising the 50 per cent of the total severally.

Planning \$9,000,000 California State Roads.

Sacramento, Cal.—Following an agreement on the general proposition of building the seven new state highways and laterals as provided by the legislature in its appropriation of \$3,000,000 for the state's share, the state highway commission is outlining a working plan for proceeding with the improvements, which aggregate \$8,963,675. The various county supervisors will be heard and will be assisted by the highway commission in devising means for bearing their share of the expense, which has been apportioned by Austin B. Fletcher, chief engineer. The estimates made for the laterals, mileage and proportion of cost for both the state's and the county's share of construction under the present cost of material, labor, etc., are as follows: Trinity lateral—Length, 102 miles; estimated cost, \$1,175,000; state's portion, \$393,240; county's portion, \$781,760. Pacheco lateral—Length, 83.45 miles; cost, \$1,618,413; state, \$541,650; county, \$1,076,764; Mariposa lateral—Length, 32.60 miles; cost, \$533,554; state, \$178,560; county, \$354,997. Coalinga lateral—Length, 98.25 miles; cost, \$1,502,538; state, \$502,867; county, \$999,678. Cholame

lateral—Length, 91.22 miles; cost, \$1,339,596; state, \$448,320; county, \$891,275. San Bernardino-Barstow lateral—Length, 76.33 miles; cost, \$534,112; state, \$178,770; county, \$355,340. San Bernardino-Yuma lateral—Length, 195.86 miles; cost, \$2,260,462; state, \$756,510; county, \$1,503,949. The greatest expense falls upon the counties through which the new roads will pass. This is due to the increased cost of construction as compared with the estimates upon which the Legislature based its \$3,000,000 appropriation. It was figured that with the counties making up \$3,000,000 the roads could be built. It is now necessary for a redistribution of the expenses, and instead of expending \$6,000,000, as originally estimated, the cost will be \$8,963,675, leaving a difference of \$2,963,675 to be raised above the original sum. Whether the state and the federal government will assume a part of this increase will be determined later. Plans had been originally made for eight highways but high costs have necessitated cutting down the program.

SEWERAGE AND SANITATION

Believe Poliomyelitis Epidemic Checked.

Chicago, Ill.—The rate of increase of infantile paralysis in Chicago is now so slow that the health department is led to believe the disease will soon be completely checked. Cooler weather of the past few weeks is given as the chief ally. By Oct. 1 the total number of cases in the city was 170. Altogether seventy cases were reported for the last week of the month as against sixty-six for the preceding week. An educational drive was launched when 12,000 pupils of high schools and advanced grades in grammar schools were called to attend a series of public health meetings. They were told of the causes of the disease and preventives. Each pupil represented some unit of Chicago's 300,000 school children. It is believed to be the first time such a series of meetings was held. It is planned to hold regular meetings hereafter with stereopticon views, moving pictures, and posters. Health commissioner Robertson pointed to the seventeenth ward situation as an example of the effectiveness of the department's precautionary measures. On the commissioner's recommendations this ward was given a thorough cleaning by the street department. There was not a new case of the disease reported in several days while a few weeks ago it had more cases than any other part of the city.

War Adds \$2,000,000 to Passaic Sewer Cost.

Newark, N. J.—War prices have added approximately \$2,000,000 to the estimated cost of the Passaic Valley sewer. Chief engineer William M. Brown has reported to the sewer board that a new estimate based on present conditions indicates that \$15,500,000 may be required to complete the work. Following the presentation of this report, the board authorized preparation of supplemental contracts, based on these figures, for submission to the fifteen municipalities in the original contract. Contributions which will be made to the cost of the sewer if the municipalities which have applied are actually admitted will total approximately \$2,426,339. Chief engineer Brown's report said in part: "Prior to November, 1916, an estimate was made of the cost of completing the sewerage work. The estimate showed the total cost to be \$13,500,000 under conditions then prevailing. Since that date the cost of all construction material and labor has advanced rapidly,

due to changed economic and war conditions. The lowest bid received in June, 1917, for the construction of Section 2 of the outfall tunnel was \$750,000 above the fair cost at the time the estimate was made. At this date there is little to indicate that prices will not remain at a high level for a long time to come. An estimate at this date indicates that the cost of the sewerage work may total \$15,500,000. It seems to me to be imperative to complete the sewer at as early a date as possible, both because of conditions which exist in the Passaic Valley, due to pollution of the river, and because of the large amount of money already invested by the municipalities in this enterprise." The six municipalities expected soon to join those in the original contract, and their contributions are as follows: East Orange, \$1,189,319.14; Orange, \$555,480.19; Bloomfield, \$234,193.64; Glen Ridge, \$125,623.39; Haledon, \$34,037.72, and Prospect Park, \$18,037.43, a total of \$2,156,691.52. In addition to this amount, interest payments will total \$269,644.77, making a total contribution of \$2,426,336.29 by the six municipalities, if they are admitted. It is hoped to have the sewer in operation by December 31, 1918.

Epidemics Cause Closing of Public Places.

Murphysboro, Ill.—The city commissioners ordered all schools, picture shows, churches, and other meeting places closed following the discovery of fifteen cases of smallpox, four cases of diphtheria, and one of scarlet fever in the city.

Police Power to Compel Connection with Sewer.

Atlantic City, N. J.—Holding that is not an unreasonable exercise of police power by a city to require an abutting land owner to connect his building with a public sewer, notwithstanding he may already have a private sewer, the supreme court at Trenton has affirmed the conviction of Charles Fenton of this city for failure to obey its requirements in this respect. Fenton's property has a private pipe line, which empties into the Thoroughfare. Fenton contended that the city had failed to charge him with a nuisance, but the supreme court holds that it is not necessary to wait until a nuisance exists and to put public health in jeopardy in the meantime. "A board of health would meet with merited condemnation if it stood by and took no steps to produce by the exercise of ordinary prudence a sanitary condition which would prevent an epidemic of disease likely to grow out of known conditions," says the opinion.

Typhoid Epidemic Traced to Water Supply.

South Bend, Ind.—The city's epidemic of typhoid fever, which for some time threatened to pass beyond the control of local health authorities and which has resulted in the deaths of seven persons, originated from a polluted municipal water supply, according to a statement made by major J. O. Cobb, United States army surgeon, who conducted an investigation. Major Cobb and lieutenant C. D. Akin arrived in South Bend as soon as the epidemic assumed alarming proportions. Attention was immediately given to the water supply inasmuch as all trains passing through the city take on supplies here. In view of the situation it will be necessary to prohibit the use of city water on trains for interstate passengers. In submitting his report to mayor F. W. Keller, the board of public health, and the city water department, major Cobb outlined five corrective measures that should be adopted by the city in order to maintain a high standard of water. These are "Immediate installation of chlorine treatment apparatus. Discontinuance of the central reservoir pending reconstruction. Elimination of the wells in the river at the central pumping station by filling with concrete, as was practiced by the superintendent of the city water supply in connection with the recent closing of the eight wells at the north pumping station. Rearrangement of the supply systems at both stations, so that water from the wells will store in the reservoirs by natural flow. Removal of the potential danger of suction in the present 24 inch and 16 inch mains crossing the race by substituting direct pumping into these mains." The report continues: "In reviewing the present typhoid epidemic, there are im-

portant factors, other than water, for the public of South Bend to consider. Right in the center of the city there are many dangerous privy vaults. Typhoid fever can never be stamped out entirely so long as this condition is continued. Typhoid fever has existed in this city for a number of years and in all seasons. During this time human carriers of the disease may have originated. In fact, it would be astonishing if this were not the case. That the present outbreak is from a common source of infection uniformly spread over the city, involving all classes of society, is obvious on examination of all the data at hand. That this common source of infection is wholly from the water supply is debatable ground. However, I have come to the conclusion that the majority of the present cases originated from that source." Plans for reconstructing the water system have been made by water superintendent John W. Toyne and chlorine apparatus ordered. The reservoirs have been drained. The school children are being vaccinated against typhoid when requested by their parents. Dr. Charles Bosenbury, secretary of the board of public health, said that while the people were warned on Aug. 26 to boil all water, there still seems to be a general apathy towards the use of boiled water. As a consequence there are numerous cases breaking out all over the city. There were 132 cases reported in September. The supply of drinking water has been turned off in the city hall and all other public buildings since the report of the federal authorities.

"Movies" Help in Health Week.

Minneapolis, Minn.—The city is celebrating "Health Week" this week. All agencies of publicity have been enlisted to impress the message of public health in the minds of the people. Health films and health slides will be shown in Minneapolis motion picture theaters during the whole week, Oct. 6 to 12. Some of the reel titles are, "The Error of Omission," "The Great Truth," "From Field to Cradle," and a slapstick comedy, "Swat the Fly." The feature film will be "The Street Beautiful." Health films and slides will be shown in 35 motion picture theaters, downtown and in the neighborhood sections. Similar cooperation has been obtained from the churches, and Oct. 7 was proclaimed "Health Sunday." Local pulpits were filled by visiting physicians, social workers and Red Cross nurses who gave messages of health. The opening event was the health parade at 2 p. m., Oct. 6. The Mississippi Valley conference on tuberculosis met in the city on Oct. 8 and 9 and was attended by almost 1,000 physicians, hospital superintendents, social welfare workers and nurses. The schools were also visited by speakers. Mrs. C. A. Donaldson, of the Woman's auxiliary of the Hennepin County Medical society and a group of women workers recruited automobiles to transport the speakers. There were also neighborhood meetings in all sections of the city. Dr. P. R. Thomas, of the oral hygiene committee of the Minneapolis District Dental society had 50 minute men who visited schools, shops and factories and spread the gospel of care of the teeth as a means of staving off disease. A mass meeting was held Oct. 9 at the auditorium at which Dr. Marion LeRoy Burton, president of the University of Minnesota, presided.

Reorganizing Buffalo's City Hospital System.

Buffalo, N. Y.—The council recently passed ordinances transferring the jurisdiction of the bureau of hospitals and dispensaries from the commissioner of health to the Board of Managers of the City Hospital. This important step was not taken hastily. Almost from the very beginning of his administration, nearly eight years ago, health commissioner Fronczak and other interested officials had the plan of consolidation in mind. February 20, 1909, the then board of health issued a proclamation, declaring the city of Buffalo in the grip of a scarlet fever epidemic. This was a necessary legal step in order that money might be appropriated immediately for the purpose of combating the scourge. An old abandoned school house was converted into a temporary scarlet fever hospital. It was hoped at the time that the need for its use would be short lived. Several attempts were made to close the

institution, but each time the problem presented itself as to what would be done with the patients on hand. In spite of the improved service afforded by the temporary institution new patients kept taking the place of the old ones. Finally, in response to an insistent demand on the part of the local physicians, the wooden building next to the brick schoolhouse, which was used as an annex, was opened for the treatment of diphtheria cases. The board of aldermen appropriated funds to defray the expense of having the institution put in presentable shape for a more or less permanent occupancy. The campaign of improvement was inaugurated, which is still unfinished in spite of the fact that the Department of Hospitals and Dispensaries now has available 670 beds and a staff of 140 employees. After long agitation a large plot of ground, consisting of 83 acres, was purchased by the city, and the comprehensive plan of city hospital construction started under way. On or about November 1, 1917, the new Buffalo city hospital, since erected on this site, will be ready for occupancy. Just as soon as the psychopathic and tuberculosis departments of this hospital are settled in good working order steps will be taken to insure the erection of additional buildings on this property so that the remaining departments of the municipal hospital and the Ernest Wende hospital may be housed in this same institution. Coincident with the growth of the various hospitals of the department of health came the development of the five health centers covering the entire city, each in charge of a city physician working on full time at an adequate salary. The new change in management is the culmination of years of constant study and work on the part of the department of health, with the idea of completing a hospital system which would meet all present needs and adequately provide for the future. While the hospitals and dispensaries as now managed are apparently divorced from the department of health really such is not the case. Health commissioner Fronczak is chairman of the general advisory board of the Department of Hospitals and Dispensaries, and also a member of its advisory board on health centers. The work of the Department of Hospitals and Dispensaries will proceed along the same lines as heretofore. Credit for the development of the hospital system is particularly given to mayor Fuhrman, health commissioner Fronczak and Dr. Walter S. Goodale, who was first tenement house inspector and later at the head of the original hospital, and has now been appointed superintendent of hospitals and dispensaries.

WATER SUPPLY

Water System Nears Completion.

Aberdeen, Wash.—Within three months the new water system of Aberdeen, which has cost over \$400,000, will be finished. The dam which is being built above the falls of the Wishkah, which is a part of the system, is about half completed and about two miles of pipe are still to be laid. A supply of 15,000,000 gallons of water daily will be available, which is sufficient to supply a city of three times the present population of Aberdeen. All the work on the water project has been done by day labor and city engineer L. Kelsey, who has had charge of the work, declares that he will be able to show a considerable saving in the cost of the pipe line over the lowest bid which was received on the work before the city decided to carry it on by the day labor. The water is taken 22 miles north of this city.

Injunction Stays Wanaque Contract.

Newark, N. J.—Upon application of Gilbert Collins, representing the Society for Establishing Useful Manufactures, the court of errors and appeals, at Trenton, has granted a temporary stay enjoining the actual execution of any contract between the North Jersey district water supply commission and any municipality of Wanaque watershed. The stay, which will be operative until the November term of the court, was made in such form, however, as to permit the continuation of preliminary arrangements up to the actual execution of the contract. Modification of the stay, first asked for by Mr. Collins, was obtained by Spaulding Frazer, city counsel of Newark, who pointed out

that before the execution of any contract a number of preliminary steps, such as the approval of a form of contract and authorization for its execution, might be continued without prejudicing the case of Mr. Collins' client. This course was assented to by the court, which directed that the stay be drawn in the form suggested by Mr. Frazer, and that it be made operative until the opening day of the term, when argument will be heard on the question of continuing the stay, pending determination of the appeal of the S. U. M. from the recent decision of the supreme court, dismissing the writ of certiorari by which it was sought to enjoin the proposed contract for the construction of a reservoir or reservoirs upon the Wanaque watershed.

New York Aldermen Think Water Free as Air.

New York, N. Y.—The board of aldermen has definitely and finally rejected an ordinance proposed by commissioner William Williams of the Department of Water Supply, Gas and Electricity, providing for compulsory installation of water meters in apartment houses, although the commissioner had modified his original proposition so as to include only elevator apartment houses. This action was taken on the recommendation of the committee on public welfare. The committee reported that, having held three public hearings and being impressed with the fact that the public is "almost unanimously" opposed to the use of water meters in any class of apartment houses, it felt that the commissioner's request ought to be rejected. In the opinion of the committee, "water should be as free as air." In a communication to the board commissioner Williams explained that the ordinance as modified would affect only about 2,100 dwelling houses in Greater New York. "I write you this letter," he said, "so as to make perfectly clear the department's position and recommendation. Most of the opposition at the three hearings held by the Welfare Committee proceeded from persons having no interest whatever in the limited number of buildings to which the department from the outset intended its resolution to refer and to which the resolution as amended does refer."

STREET LIGHTING AND POWER

Cost of Park Lighting.

Washington, D. C.—The recently published report of director Rogers of the Bureau of Census on General Statistics of Cities for 1916, dealing with park and recreation facilities, contains interesting data on the cost of lighting in parks. Eighteen cities have reported the rates per kilowatt-hour in force, as shown in the accompanying table. Differing conditions and restrictions in lighting contracts are given as the reasons for some of the variations in rates. These may be affected by franchise considerations or street privileges or other matters of a similar nature:

City	Rate per Kw.-hr.	City	Rate per Kw.-hr.
St. Louis, Mo.....	\$0.03 3/4	Wilmington, Del....	\$0.05
Baltimore, Md.....	0.02	Okla. City, Okla....	0.06
Los Angeles, Cal....	0.04	Peoria, Ill.....	0.04
Buffalo, N. Y.....	0.07	Wichita, Kan.....	0.05
Seattle, Wash.....	0.03 1/2	El Paso, Tex.....	0.08
Portland, Ore.....	0.02 1/4	York, Pa.....	0.10
Toledo, Ohio.....	0.05	Topeka, Kan.....	0.05-0.07
Dayton, Ohio.....	0.04	Colorado Spgs., Col.	0.03
Kansas City, Kan...	0.06	Zanesville, Ohio....	0.03

Commission's Gas Rate Decision Taken to Court.

Providence, R. I.—Alleging that the Public Service Commission has no authority to order suspension of a proposed increase in gas rates, pending investigation, the Providence Gas Company has filed an appeal from such action with the supreme court. The gas company filed notice of a proposed increase in rates, which was to go into effect Oct. 1. The Public Service Commission denied permission for the raise until further investigation was made. In its petition on appeal filed by the gas company it says that the proposed schedule of rates was filed with the Public Utilities Commission Aug. 20 to become effective Oct. 1. On Aug. 29 the commission gave notice to the gas company that after the expiration of 10 days it would proceed to investigate the reasonableness of the rates in

the schedule. A hearing was begun Sept. 24, when certain facts and arguments were presented, and the commission requested the company to furnish other figures and data at a continuance of the hearing. The order of the commission is alleged to contravene the constitutions of the state and of the United States. Citation is asked to issue to the Public Utilities Commission and the cities of Providence and Cranston and the towns of Johnston, Smithfield, Warwick and East Providence. The gas company asked the court to reverse the order of the commission. The contention of the counsel for the Providence Gas Company is that the rates in the new schedule were the legal rates as soon as they went into effect on the morning of Oct. 1. The commission ordered suspension of the new rates on the same afternoon. The gas company contends that the Public Utilities Commission "is without power or authority to suspend the operations of said schedule of rates until and unless said Public Utilities Commission has, after a hearing and investigation under the provisions of the statutes, found said rates to be unjust, unreasonable, insufficient or unjustly discriminatory, or to be preferential or otherwise in violation of any of the provisions of the statutes." The order of the Public Utilities Commission "is unlawful and unreasonable in that it was entered without said Providence Gas Company being given any opportunity to be heard in the premises," says the petition filed with the court. Also the order is declared to be unlawful and unreasonable "in that it prohibits the Providence Gas Company from charging the rates in said schedule of rates, even though said Public Utilities Commission might be required to find, upon a hearing on the merits of an investigation, that said rates are proper, just, reasonable and fair." The gas company further contends that the order of the Utilities Commission is unlawful and unreasonable "in that it is based upon a finding of the Public Utilities Commission that sufficient facts have been established before said Public Utilities Commission simply to raise a question as to the reasonableness of said rates, whereas said Public Utilities Commission is authorized and empowered by law to suspend rates only upon a finding that said rates are unjust, unreasonable, discriminatory or otherwise in violation of the statutes." Meanwhile the hearings continue.

City Sues on Franchise Contract.

Oshkosh, Wis.—Whether or not the Eastern Wisconsin Electric company will be required to continue paying the city of Oshkosh \$1,000 a year for the remainder of a thirty-five year period in accordance with a franchise contract entered into between the city and the Eastern Wisconsin Railway and Light company, predecessor of the Eastern Wisconsin Electric company, is to be determined by the courts. Following the latter company's refusal to pay the \$1,000 due this year under the terms of the franchise and the instructions of the commission council, corporation counsel Frederic J. Eaton has instituted in the Winnebago county circuit court, in behalf of the city, an action to compel the Eastern Wisconsin Electric company to make the payment. In the complaint it is recited that the Eastern Wisconsin Railway and Light company is now and was a corporation existing under the laws of Wisconsin and operated under the terms of a franchise passed by the Oshkosh common council November 10, 1903, an inter-urban electric railroad into Oshkosh from Fond du Lac up to March 1, 1917, when the line was sold to the defendant, the Eastern Wisconsin Electric company; that the latter company is the successor of the former and is now operating the railroad into Oshkosh by virtue of the privileges granted to the former in the franchise referred to. It is also stated that November 10, 1903, the city of Oshkosh passed an ordinance granting the Eastern Wisconsin Railway and Light company, "its successors and assigns" the right to lay and maintain a single or double track along certain streets and along the Main street bridge. The ordinance expressly stipulated that, in return for this privilege, the Eastern Wisconsin Railway and Light company, "its successors and assigns" was to pay the city \$35,000, in payments of \$1,000 a year on or before July 1 of each year for thirty-five years. It is stated that the company accepted the terms and conditions of the franchise and a copy of the written acceptance is made a part of

the complaint. After the acceptance of the franchise, the Eastern Wisconsin Railway and Light company paid to the city \$1,000 a year in accordance with its conditions from the time it was granted up to and including the payment July 1, 1916. On March 1, 1917, the Eastern Wisconsin Railway and Light company sold its railway to the Eastern Wisconsin Electric company and that the latter thereupon assumed possession of the property and liabilities and all the provisions of the franchise, and the complaint says that it is operating the same as the successor and assign of the former company, but has failed to make the payment of \$1,000 due July 1, 1917.

FIRE AND POLICE

Four Departments Save Coal Stores.

Gary, Ind.—Fire departments of four cities were required to extinguish a fire which recently threatened the destruction of 171,000 tons of coal in a Michigan Central reserve yard in East Gary. The blaze was controlled after nearly 100,000 tons were destroyed. Firemen were sent to the scene from Gary, Hammond, East Chicago and Michigan City.

Soldiers Help Fight Fire.

Lawton, Okla.—Lawton suffered fire damage recently estimated at \$150,000. The fire started in a junk shop and the flames rapidly spread to an ice cream factory next door and then to a hotel. In less than half an hour the whole side of the block was in flames. Explosions of tanks in the ice cream factory blew pieces of machinery many feet in the air. The fire rapidly spread to the avenue. A great many stores and residences were destroyed, all frame buildings. Fort Sill officials were notified and immediately sent in their fire-fighting outfits, engines, hose and men. Many hundred soldiers were sent to do patrol duty. Truck after truck brought hose and men and the men were used in relays that proved effective. The business district was put under martial law immediately following the fire. The loss on stocks was heavy. The rate demanded by the companies in these districts was high and many of the business men carried but little insurance. Several of the soldiers were injured by falling timbers and some of them burned severely.

Policewoman for Duluth.

Duluth, Minn.—Commissioner of public safety Silberstein has announced the appointment of Miss R. P. MacGregor as policewoman. Miss MacGregor, who will assume her new duties on Oct. 1, will be the first policewoman in the city of Duluth and she will have all the powers of a member of the local police force. Miss MacGregor will receive \$75 a month, the regular salary for new patrolmen. In making the announcement of Miss MacGregor's appointment, commissioner Silberstein said that the new policewoman will make it a point to protect young girls, especially on downtown streets and in dance halls throughout the city. She will have police powers and authority to make arrests. The appointment of Miss MacGregor was recommended by police chief McKercher. Miss MacGregor has been a nurse at the Children's home for the last six years.

Police Commissioner Shot by Discharged Man.

Fort Worth, Tex.—Edward Parsley, fire and police commissioner, was shot and killed in his private office in the city hall by J. K. Yates, former police inspector, who, in turn, was shot to death by officers after he had barricaded himself in the commissioner's office. Yates had threatened both mayor Davis and commissioner Parsley, it is said, and went to the city hall seeking the mayor. Not finding him, Yates went to Parsley's office. A fusillade of shots was fired and officers rushed upstairs to find the door barricaded. Chief of police Montgomery sent for riot guns and a furious exchange of shots through the door to the commissioner's office followed. The door finally was broken in and the former police inspector's body was found riddled with bullets. Mayor Davis and commissioner Pars-

ley took office after the last city election. When appointments were made to the police force Yates' name was not on the list. Friends said that Yates had been brooding over the loss of his position, and it is reported he had threatened to "clean up" at the city hall unless put back to work. A special election has been called for the purpose of naming a successor to the dead commissioner.

Big Stockyards Fire.

East St. Louis, Ill.—Several hundred horses were burned to death in a big blaze which swept the National stockyards and caused damages totalling almost half a million dollars. The stockyards hotel, which had 300 rooms, was wholly destroyed. Several pieces of apparatus was sent by the fire department of St. Louis, Mo.

Fireboats Fight Difficult Blaze.

Baltimore, Md.—Fire, resulting probably from spontaneous combustion, destroyed the manufacturing plant of a big guano company and damaged also the storage plant of the same company which lay alongside the burned building. The fire also threatened a nearby shipbuilding plant. On reaching the scene chief Kahl sent for the fireboat Cataract, and later for the Deluge. Fourteen lines of hose were run from the two boats to help feed the land companies with water. Chief Emerich was also on the scene by the time the third alarm had been sounded. The firemen had a difficult time in keeping the blaze from reaching the shipbuilding plant because the wind was blowing vigorously that way. The burned plant included, besides stores of guano, bagging and ammonium salt, several electric motors and a good deal of machinery, the total loss being over \$200,000.

Electric Plant Burned Out.

Groton, S. D.—A late evening fire nearly wiped out the power plant of the Groton Light, Heat and Power company and left the city in darkness, fire starting in the east end of the building above the steam boiler. The fire had already spread to the upper part of the building and some distance west when discovered. Delay in getting the fire fighting apparatus to the scene of the conflagration allowed the flames to gain such headway that there seemed small hope that anything would be left of the plant. However, the walls of the building being of cement block construction, by good work on the part of fire chief Rathbun, assisted by W. J. Paetznick and others, the fire was confined to the ceiling and roof of the main part of the building and after several minutes of hard fighting was gotten under control. The steam power unit and the gasoline power unit which were located in the main room of the building were put completely out of commission by the intense heat and falling debris. Fortunately the Muncie oil engine, which was located to the west, and the generator with which it was connected, located in the addition on the north, were not injured, thus leaving one complete generating unit which was put into shape as rapidly as possible and with which the company was able to furnish a limited service.

GOVERNMENT AND FINANCE

Police Chief-Mayorality Candidate Dies.

Toledo, O.—Former police chief George A. Murphey, who had been nominated as third candidate to run for the position of mayor in the coming election, died following a number of operations. The death has complicated the election situation, as the charter and the primary election regulations make no provision for such a contingency, merely requiring that the three highest candidates at the primaries be nominated. Regarded by many of his friends and followers as "the mayor without an office" because he received the highest number of first choice votes under the preferential system of voting for mayor two years ago, Murphey left a strong imprint upon the political history of the city. He was traffic officer near city hall when former mayor Keller assumed office. Keller appointed him chief of police January 28, 1914. Incident to the change of political policies and affiliations which marked the beginning of his second year in office, mayor Keller removed

Murphey from the head of the police department, a year after his appointment. Murphey, with characteristic energy, refused to submit tamely to removal. He made a fight before the civil service commission, which modified the mayor's order and reduced Murphey to a patrolman. Murphey never reported for duty as patrolman, and eventually was dropped from the rolls. Following the prediction that if Keller removed Murphey as chief, the action would make Murphey mayor, a movement for Murphey was started soon after his dismissal. Without financial means of his own, Murphey led a fight in which he outran his former superior in the election, leading all the candidates in first choice votes. Early in Mayor Milroy's term Mr. Murphey was restored to the police rolls and assigned to duty as a detective, but later obtained leave of absence. Murphey was first appointed a patrolman by the board of police commissioners April 15, 1903.

Commission Form Adopted

Albuquerque, N. M.—This city has decided in favor of the commission form of government. The election resulted in a substantial majority for the new charter. The new form was opposed by the politicians and the local morning paper. The evening paper backed the commission plan.

Public Service Corporations in West Virginia.

Charleston, W. Va.—The grand total of assessments of all the public service corporations of the state, as made by the state board of public works for the year 1917, is \$336,430,869.99, an increase of about \$15,000,000 over last year, according to the announcement by secretary of state Houston G. Young who is secretary of the board. Steam railroad companies in the state were assessed at \$187,115,300, a decrease of \$164,700; street railway companies were assessed at \$15,441,000, an increase of \$485,000; express companies were assessed at \$547,024.95, an increase of \$31,424.95; private car line companies were assessed at \$612,244, a decrease of \$10,755; bridge and ferry companies were assessed \$1,909,700, an increase of \$413,500; electric light, water and power companies were assessed at \$12,090,455, an increase of \$1,878,589; oil and gas companies were assessed at \$112,003,500, an increase of \$10,373,008; telephone and telegraph companies were assessed at \$6,711,646.04, an increase of \$640,322.57. The Baltimore & Ohio Railroad has by far the largest single assessment of all the public service corporations in the state, it being rated at \$78,000,000. The Norfolk & Western Railroad is second largest, with an assessment of \$35,000,000. The assessments were made by the board after several weeks of consideration of oral statements and written briefs presented by representatives of the several companies concerned.

TRAFFIC AND TRANSPORTATION

Four-Cent Tickets Abolished.

Seattle, Wash.—The sale of twenty-five car tickets for \$1 has been discontinued by the Puget Sound Traction, Light & Power Company, in accordance with a decision of the public service commission, dismissing the protest of the city of Seattle against the company's tariff supplement, which provides for a straight 5-cent fare. The only exception to the flat rate is that of 2½ cents for school children during the school year, which will be continued by order of the commission. In the contention over the franchise tax on its gross earnings the company suffered a legal reverse that will result in the city taking judgment for \$64,387.78, the amount of 2 per cent of its gross earnings for 1916. Corporation counsel Caldwell asked the superior court of Thurston county for a writ of review on the grounds that the public service commission had never made a valuation of the properties of the Puget Sound Traction, Light & Power Company, and that the public service commission act provided that nothing contained therein should prevent issuance of commutation tickets. "While the public service commission disposed of the 4-cent fare issue with great speed," said Mr. Caldwell, "they still have not decided my motion to dismiss the company's application to be relieved of all its franchise obligations."

In assuming jurisdiction the commission has raised a legal point that may be fought out in the supreme court before a settlement is reached. The city of Seattle protested against the filing of the new tariff section which eliminated the 4-cent fare. The city contends that the commission has no jurisdiction by reason of the fact that the sale of the 4-cent tickets in books of twenty-five each is a provision contained in the charter under which the company is permitted to operate in Seattle, and that the state body has no right to void a franchise provision. The commission, however, has assumed jurisdiction. The commission said in part: "This commission has never determined the value of the company's railway system in Seattle. One of the general officers of the company testified at the hearing that his company was at large expense to determine the actual money which has gone into the system, exclusive of the power plant, and that the net amount which has gone into the system (exclusive of power) as in use is approximately \$15,000,000. In Seattle the company for the first six months of 1917 received an average fare per revenue passenger of 4.67 cents, while the average revenue received from all passengers was 3.46 cents. We find the average length of line in Seattle is 5.16 miles. The longest haul for 5 cents is 17.953 miles, the longest haul for 4 cents is 9.837 miles. Late increases in trainmen's wages amount to \$130,000 a year. A reduction in the working day from nine to eight hours in the shops and power houses amounts to \$2,000 a month, or \$24,000 a year. (The eight-hour day is one of the problems which the arbitration board now in session will settle.) A reduction from nine to eight hours in track and paving work amounts to \$1,100 a month, or \$13,200 a year. The elimination of the 4-cent ticket and the substitution of a straight charge of 5 cents will increase the revenues of the company approximately \$150,000 a year." The writ of review was granted. In applying for it the corporation counsel held: "That the order signed by the commission was and is unreasonable and unlawful, especially in that it assumes that \$15,000,000 is the value of the railway properties of the company when, in truth and in fact, the commission has never determined the valuation of the respondent's system in Seattle, and had before it, at the time of accepting said valuation as the basis of its order that the 4-cent ticket was an unreasonably low rate, no competent evidence of the value of the company's property upon which it should be permitted to figure a reasonable return. That the commission is not authorized by law to direct or permit the elimination of a commutation ticket which the company has specifically agreed to furnish and sell as a condition to its right to occupy the streets of Seattle. That the commission based its order upon incompetent and secondary evidence, and denied to the complainant, the city of Seattle, the right to cross-examine witnesses and the right to examine the evidence considered by the commission."

Engineering Society Disapproves Transit Plan.

Cleveland, O.—The executive board of the Cleveland Engineering Society has issued a report on the proposed rapid transit commission ordinance, to be voted on at the November election. This report, which follows one made to the board by a special committee, disapproves of the plan in the ordinance. The board thinks that the City Planning Commission should first make a careful study of the subway matter, develop plans and acquaint the citizens with the details of the improvement. After this, the committee feels, it might be advisable to appoint a commission under the provisions of the state law to execute these plans. According to the board, only in this way will it be possible to formulate plans for both the present and future needs, and it is argued that whatever is done in the way of improvements to meet immediate demands should be a part of a general scheme which will also be adequate for the future growth of the city. The society emphasizes that it is not opposed to the construction of subways, but that the members believe that subways and underground terminals are necessary now. It is felt, however, that such an important improvement should be well planned, so that there may be no mistakes that might block extensions later on.

LEGAL NOTES

A Summary and Notes of Recent Decisions— Rulings of Interest to Municipalities

Ditch Dug by City—Liability of City.

(Texas Civ. App.) Where a city itself directed the digging of a ditch across a sidewalk, and at the time of an accident it was in practically the same condition as when it was opened, the city could not claim ignorance of the defect.—*City of Henderson v. Fields*, 194 S. W. 1003.

Bond Issuing Power of Municipalities for Filter Plants.

(Ohio.) Gen. Code, § 1259, confers independent bond issuing power on municipalities to provide funds to comply with orders of state board of health requiring installation of filtration plant.—*State v. Dean*, 116 N. E. 37.

Maintenance Bonds.

(Texas Civ. App.) Judgment permitting city to retain money due street improvement contractor in lieu of maintenance bond should be modified to protect right to unused portion of the fund at the end of the maintenance period.—*Lion Bonding & Surety Co. v. First State Bank of Paris*, 194 S. W. 1012.

Police Power—Definition.

(New York Sup.) "Police power" of city means power to prevent, anticipation of danger to come, active and earnest interest to protect people, and in so doing to curb and restrain individual tendency.—*Mannix v. Frost*, 164 N. Y. S. 1050.

Obstruction in Street—When Actionable.

(W. Va.) Not every obstruction to use of street whether authorized by municipal corporation or not, irrespective of its character or purpose, constitutes a nuisance or is actionable in damages; as right to use of street is subject to necessary limitations.—*Johnson v. City of Huntington*, 92 S. E. 344.

Maintaining Waterworks Not Governmental Function.

(Ky.) A city in maintaining waterworks is in the exercise of a private, as distinguished from a governmental function, and so liable under the same circumstances as an individual for injury to another through its servants' negligence.—*Flutmus v. City of Newport*, 194 S. W. 1039.

Reasonableness of Ordinance.

(Tex. Civ. App.) Question as to reasonableness or unreasonableness of ordinances is open to inquiry, unless expressly authorized by the legislature.—*Munger Oil & Cotton Co. v. City of Groesbeck*, 194 S. W. 1121.

Police Power—Health Ordinances.

(Ill.) The most important police power of the municipality is that of caring for the safety and health of the community, and ordinances for that purpose should be liberally construed.—*Biffer v. City of Chicago*, 116 N. E. 182.

Sewer System—Failure to Construct.

(Wis.) Although a village has power to lay out a general sewer system, it is not liable for failure to do so to an individual property owner who claimed his ponds had become contaminated.—*Crystal Spring Brook Trout Hatchery Co. v. Village of Lomira*, 162 N. W. 658.

Contract Work Under Burdensome Conditions—Extra Pay.

(Oregon.) So far as work done without their contract by contractors with a city to erect a dam conforms to the contract in character and in the conditions under which it is done, the contract price will govern the contractors' extra recovery on a quantum meruit against the city. When contractors with city to erect dam did extra work under burdensome conditions not within contemplation of parties, deviations from contract being so material as to entitle contractors to recover on quantum meruit, recovery allowed should take form of damages adequate to compensate for additional burdens which damages should be added to contract price.—*Hayden v. City of Astoria*, 164 P. 729.

THE MUNICIPAL INDEX

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals.

It is our purpose to give in the second issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading English, French and German ones, dealing more or less directly with municipal matters. The index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current literature on municipal matters. In furtherance of this we will furnish any of the articles listed in the index for the price named after each article, except that where an article is continued in two or three issues of the paper, the price given is for each of said issues. In addition to the titles where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article.

ROADS AND PAVEMENTS.

Bituminous:

Bituminous Surfaces for Macadam Roads. From a report of the Ontario Highway Dept. 1,500 words. Engineering and Contracting. September 5. 10 cts.

Bituminous Concrete for Patching Roads. How to properly repair depressions and maintain a smooth surface. By A. H. Hinkle. 1 ill. 1,700 words. Better Roads and Streets. September. 15 cts.

Bituminous Foundations for Sheet Asphalt Surfaces. Letters from H. W. Skidmore and R. M. Green. 1,200 words. Engineering News-Record. September 27. 15 cts.

Combination Roads to Sustain Traffic Weights. By D. T. Pierce. 3 ill. 2,500 words. Better Roads and Streets. September. 15 cts.

Bituminous Wearing Surfaces for Highway Bridges. Illinois Highway Department has been using bituminous mastic and bituminous concrete with success. Latest specifications for both types. 1,100 words. Engineering and Contracting. September 26. 10 cts.

Construction of National Pavement in New Jersey. Methods of laying this pavement, which consists of finely divided earth and asphalt. Motor trucks used for hauling. 5 ill. 1,300 words. Good Roads. September 29. 10 cts.

Brick:

Bituminous-Joint Brick Pavement Still Preferred. Warren, Ohio, has excellent results with asphalt joints. 800 words. Engineering News-Record. September 27. 15 cts.

Concrete:

Street and Road Pavements. This article has a special reference to concrete. 2 ill. 3,500 words. Cement and Engineering News. September. 20 cts.

Contractors Roll-Finish Concrete on Five Vermillion County Roads. Four sizes of rollers give good finish. Roller 12-in. by 4 ft., weighing 56 lbs., most convenient. Rolling squeezes out water and sinks coarse aggregate below surface. 1 ill. 1,000 words. The Contractor. September 28. 10 cts.

Reinforced Concrete Wheel Tracks for Roadways. 1 ill. 1,000 words. The Surveyor. August 24. 40 cts.

Repair of Concrete Pavements; Cracks and Joints. By A. H. Hinkle. 2,500 words. Concrete Highway Magazine. September. 10 cts.

Concrete Road Construction on a Water-Soaked Sub-Grade. 1 ill. 400 words. Engineering and Contracting. September 5. 10 cts.

Apportion Concrete Mixture on Road Job at Loading Hoppers. Motor Truck makes 7 miles an hour. 4 ill. 750 words. Engineering News-Record. September 6. 15 cts.

Resurfacing an Old Road with Concrete. Machinery and methods used in the reconstruction of an old road. Motor trucks for hauling aggregates. 4 ill. 1,600 words. Municipal Journal. September 13. 10 cts.

Concrete Pavement Specification of Ohio State Highway Department. 3 ill. 1,000 words. Engineering and Contracting. September 5. 10 cts.

Construction:

Permanent Road Building in Contra Costa County, California. By R. R. Arnold. 3 ill. 1,000 words. Concrete Highway Magazine. September. 10 cts.

Laying Pavements in Alleys. Description of methods used on such work in Baltimore. By Daniel J. Hauer. 2 ill. 1,000 words. Cement Era. September. 20 cts.

Widening and Straightening a Connecticut Highway. Replacing one grade and two overhead crossings by concrete arch bridge. Making a fill while maintaining a way for traffic. Steam shovel

for light and heavy grading. 10 ill. 1,600 words. Municipal Journal. September 13. 10 cts.

Subgrade Not Rutted Where Concrete Materials Are Hauled Over Track Laid on Street. Power-dumping batch-sized cars are used. Extra wagon keeps cement and sacks dry and saves handling. Screening methods produce waveless surface with minimum of labor. 8 ill. 1,100 words. The Contractor. September 28. 5 cts.

Boxes on Motor Trucks Facilitate Handling of Road Materials. 500 words. Engineering and Contracting. September 5. 10 cts.

County and Town:

Town and County Highway Data. Information concerning road construction in towns and counties in many states. Construction details and costs and methods of surface treatment. 4½ pages. Municipal Journal. September 13. 10 cts.

Road Improvement in Whatcom County, Washington. By Charles A. Lindberry. County Engineer. 6 ill. 2,500 words. Good Roads. September 22. 10 cts.

Construction and Maintenance of Highways in King County, Washington. By C. E. Morford and C. F. Mowry. 7 ill. 3,500 words. Good Roads. September 22. 10 cts.

Appliances Owned by Highway Authorities. Machinery owned and operated by counties and towns for highway work. 4,500 words. Municipal Journal. September 13. 10 cts.

Design:

Getting The Right Type of Road. By Rodman Wiley, Comr. of Roads, Kentucky. 1,000 words. Southern Good Roads. September. 10 cts.

The Selection of Pavements. From a paper by W. A. McLean. 1,200 words. Good Roads. September 1. 10 cts.

Side-Hill Drainage Allowed to Wash Over Roads. Between steep rock bank and lake culverts are done away and fill replaces usual retaining walls. By W. C. Slayton. 1 ill. 1,000 words. Engineering News-Record. September 20. 15 cts.

Planning County Highway Work. Abstract of paper by L. I. Hewes before Washington Assn. of County Engineers. 2,000 words. Good Roads. September 29. 10 cts.

Overflow Road Approach to Bridge Instead of Old Fill. Concrete pavement allows water to pass around the bridge as well as under it. 1 ill. 500 words. Engineering News-Record. September 13. 15 cts.

Foundations:

Pit-Run Gravel Concrete Used for Pavement Sub-Base at London. Danger of improper proportions without screening and grading; also result of too much water and of cutting down in time of mix. By R. J. Marshall. 4 ill. 2,000 words. Canadian Engineer. September 6. 15 cts.

General:

Samples of Completed Pavements Taken with Core Drill. Valuable data may be secured from use of simple machine. 5 ill. 1,000 words. Engineering News-Record. September 13. 15 cts.

Favors Continuing Iowa Road Policy. 1,500 words. Engineering News-Record. September 6. 15 cts.

Test of Concrete Road Aggregates. From a paper by J. T. Nash. 2 ill. 5,000 words. Good Roads. September 1. 10 cts.

Cost of State Aid Road Surveys in Illinois. By C. M. Hathaway, Assistant Road Engineer. 2 ill. 800 words. Engineering and Contracting. September 5. 10 cts.

Good Roads a Municipal Problem. Abstract of paper by S. L. Squire, Municipal Advisor of the Ontario Highway Dept. 1,200 words. Good Roads. September 29. 10 cts.

Grade Crossings:

Safer Grade Crossings. Recommended change in profile of road at railroad crossing. 1 ill. 600 words. Municipal Journal. September 27. 10 cts.

Granite:

Italian Subcontractors Cut and Relay Old Granite Block. They work with their gangs of fellow countrymen, who have been paving stone cutters and setters in Italy and in the block quarries of this country. General contractor loosens old block, grades street and puts in concrete base and sand cushion. 3 ill. 800 words. The Contractor. September 28. 5 cts.

Gravel:

Gravel Roads. A practical talk of much interest to highway officials who have charge of roads in locality where gravel is available for use in road construction. 3,500 words. Better Roads and Streets. September. 15 cts.

Ohio River Gravel Makes Good Roads in Kentucky. Mixed with 15% of clay it gives a surface that compacts quickly. Material is pumped from river. 3 ill. 600 words. Engineering News-Record. September 27. 15 cts.

Guard Rails:

Concrete Guard Rails on Highways. By George C. Wright. 3 ill. 300 words. Concrete Highway Magazine. September. 10 cts.

Comparative Cost of Guard Rail and Flat Side Slopes or Banquettes. By C. R. Thomas. 2 ill. 600 words. Engineering and Contracting. September 5. 10 cts.

Legal:

A State-Wide County Road Law. Discussion by R. S. McCain before the North Carolina Good Roads Convention. 2,500 words. Southern Good Roads. September. 10 cts.

The Wisconsin Law Accepting Federal Aid. Brief statement of the principal provisions of law. 1,500 words. Good Roads. September 29. 10 cts.

Iowa's Provisions for Applying Federal Aid. Full text of law passed at 1917 session. 3,000 words. Good Roads. September 29. 10 cts.

Massachusetts State Road Laws Codified. 5,000 words. Good Roads. September 1. 10 cts.

The Highway Law of Washington. 2,000 words. Good Roads. September 22. 10 cts.

New Road Laws of Michigan. Recent important changes. 3,000 words. Good Roads. September 15. 10 cts.

Macadam:

Appliances in Waterbound Macadam Construction. Gravel loaded by steam shovel directly from bank into trucks. Steam shovel used for all grading over 6 inches deep. Screening and loading gravel with one handling. Details of construction of screen devised by contractor. 4 ill. 1,000 words. Municipal Journal. September 27. 10 cts.

Materials:

Location of Road Materials. Bulletin issued by the Illinois Highway Department giving location of road building materials for the use of contractors and road officials in the middle west. 18,000 words. Better Roads and Streets. September. 15 cts.

Maintenance:

Road Maintenance in the War Zone of France. Abstract of a report from a former engineer of the U. S. Office of Public Roads to Logan Waller Page. By Wm. J. Weir. 4,000 words. Engineering News-Record. September 13. 15 cts.

Road Maintenance in Los Angeles. Oiled streets ploughed up, harrowed and rolled yearly. Sand and gravel for street work obtained from the river by permanent drag and screen. Mixing oil and gravel. By C. W. Geiger. 3 ill. 1,600 words. Municipal Journal. September 20. 10 cts.

Maintenance of Concrete Pavements. The first of a series of articles explaining practical methods of maintaining the various kinds of pavements in general use on highways and city streets. By Chas. Carroll Brown. 1 ill. 3,500 words. Municipal Journal. September 13. 10 cts.

Road Types Often Condemned by Improper Maintenance. By B. H. Piepmeyer, Maintenance Engr., Illinois Highway Dept. 3 ill. 1,000 words. Engineering News-Record. September 20. 15 cts.

Sheet Asphalt:

Methods of Constructing Sheet Asphalt Pavements in New York City. Mixtures for best results under heavy traffic. Method of laying. 4 ill. 3,000 words. Good Roads. September 15. 10 cts.

State Work:

Highway Department Directory. The names and addresses of federal and state highway commissioners and engineers. 6,000 words. Good Roads. September 8. 10 cts.

State Road Work in Washington. Outline of state road system and present conditions as regards completion of work. 9 ill. 8,000 words. Good Roads. September 22. 10 cts.

Road Building in Michigan. Outlines the work of the state highway department. From an address by F. F. Rogers, State Highway Comr. 1,500 words. Good Roads. September 8. 10 cts.

Traction:

Tractive Resistance Test by the California State Automobile Ass'n. Results of tests made to determine tractive resistance on earth, gravel, macadam, topsoil and concrete surfaces. 1,000 words. Good Roads. September 15. 10 cts.

Traffic:

Road Census in Iowa. Methods and results of census to secure data concerning number, weight and class of all vehicles and kinds of tires used. 1,000 words. Municipal Journal. September 13. 10 cts.

Highway Commission, Not Legislature, Should Draft Traffic Regulations. By A. N. Johnson. 1,000 words. Engineering News-Record. September 27. 15 cts.

Traffic Regulation at Right Hand Turns. Letter from A. P. Hoover. 2 ill. 1,000 words. Municipal Journal. September 27. 10 cts.

Widening Streets:

Widening a Street for Increased Traffic. Detail of work in Indianapolis. Old pavement was not relaid. 1 ill. 1,000 words. Municipal Journal. September 6. 10 cts.

Widening Existing Streets to Meet Traffic Demands. From a paper by Nelson P. Lewis. 2,000 words. Engineering and Contracting. September 5. 10 cts.

SEWERAGE AND SANITATION.

Activated Sludge:

Comparative Tests of Air Diffusers and Devices for Dewatering Activated Sludge. Abstract of paper by Edward Bartow. 4 ill. 2,500 words. Engineering and Contracting. September 12. 10 cts.

Activated Sludge Process of Sewage Purification. A resume of the present position; describes the results at Manchester, Salford, Stamford and other places. By Edward Arden. 4,000 words. The Surveyor. August 17. 40 cts.

Filters:

Ice Forms but Sprinkling Filters Go On. Ice is sometimes 4 ft. thick on sewage filters at Rochester, but good work is done in the winter. By M. A. Bantreling, Chemist in charge. 10 ill. 1,000 words. Engineering News-Record. September 13. 15 cts.

Construction:

Wooden Sewer Form Units Forty-five Feet Long. Moved Easily on Castors. Saw mill on the job cuts lumber for sewer forms. Traveling gravity mixer places concrete for invert. Wire rope blasting mats protect water mains only a few feet away. 3 ill. 1,000 words. Contractor. August 31. 10 cts.

Methods and Costs of Construction 4,173 feet of Large Concrete Sewer. Excavation encountered, organization and equipment, general plan of operations, excavation, hand excavation and trimming, forms, reinforcement and concrete. Lining the invert with brick, back filling and repaving. Hauling by a motor truck. Costs. Insurance. By E. T. Thurston. 5,000 words. Engineering and Contracting. September 12. 10 cts.

Sewers:

Plant for 18-foot Sewer. How materials were handled speedily with industrial railway and mixer on track. By A. R. Reilley. 5 ill. 1,100 words. Concrete. September. 20 cts.

Good Sewer Work for Camp Taylor. Seepage into vitrified pipe segmental block sewer very low in spite of hurried work in saturated ground. Figures of seepage measurement. By D. R. Lyman, City Engineer. 750 words. Municipal Journal. September 6. 10 cts.

Tile and Pipe:

Drain Tile Loading Specifications. By J. H. Liberton. 1,000 words. Cement Era. September. 20 cts.

Precast Concrete Pipe Plant Composite of Several Small Special Devices. Pipe handled by twin arm traveler. Funnel buckets, sugar scoop barrows and double cross form carriers are time-saving features. 7 ill. 1,000 words. The Contractor. Aug. 31. 10 cts.

Trade Wastes:

Problems in the Sanitation and Ventilation of Textile Mills. 2,000 words. Engineering & Contracting. Sept. 26. 10 cts.

Tannery Wastes Studied. Tests of precipitation and double filtration by government lead tanners to build and run working unit. 1,000 words. Engineering News-Record. Sept. 20. 15 cts.

Trenching:

Machinery in Trenching. Three methods of varying efficiency employed by different contractors. Trench excavators and grab buckets used in different ways. 2,600 words. Municipal Journal. Sept. 6. 10 cts.

Steam Shovel and Clam Shell Do Team Work in Digging Deep Trench. Bank sheeted behind cantilever walling as shovel digs. Structural horse sets concrete pipe. 6 ill. 1,000 words. The Contractor. Sept. 14. 10 cts.

WATER SUPPLY.

Filtration:

Filtration Controls Typhoid at Niagara Falls. Mechanical filters and hypochlorite reduce high typhoid rate to minimum and saves half a million yearly. By C. B. Burdick. 2 ill. 1,200 words. Engineering News-Record. Sept. 6. 15 cts.

Recent Progress and Tendencies in Water Filtration. Abstract of paper by John W. Alvord. 1,500 words. Engineering & Contracting. Sept. 12. 10 cts.

Rapid Sand Filtration. History of its development. Negative head; essentials of filter washing. Rate control. Red water troubles. Hoover aluminum sulphate. 2,200 words. Municipal Journal. Sept. 27. 10 cts.

Finances:

Municipal Water Department Finances. Practice of several cities as to maintaining finances and accounts separate from those of other city departments. By James Furse, Comptroller of Savannah, Ga. 1,200 words. Municipal Journal. Sept. 6. 10 cts.

Forestry:

Forestry by New Britain Water Board. 450 words. Municipal Journal. Sept. 6. 10 cts.

Water Works Plant 3,600,000 Trees in New York State. 1½ pages. Engineering News-Record. Sept. 6. 15 cts.

General:

Well Yields Different Water After Being Sealed a Year. Peculiar phenomenon at Saratoga Springs. Change from soda to salt water. By C. G. Anthony. 1 ill. 1,000 words. Engineering News-Record. Sept. 6. 15 cts.

Irrigating Flume Built with Cement Gun. Self supporting flume with 2-inch wall built up on inside forms. 130 linear ft. constructed per eight-hour shift. 4 ill. 2,000 words. Engineering News-Record. Sept. 6. 15 cts.

Laboratories for Chemical and Bacterial Tests at Small Waterworks. From a paper by R. C. Werner. 800 words. Engineering & Contracting. Sept. 12. 10 cts.

Meters and Waste:

Methods of Determining and Plotting Meter Capacity. By F. B. Nelson. 1,100 words. Fire & Water Engineering. Sept. 5. 10 cts.

Los Angeles Sets Large Velocity Meter in Open Conduit. Registers on less than one second-foot showing an efficiency greater than 98%. By J. E. Philips. 3 ill. 10,000 words. Engineering News-Record. Sept. 6. 15 cts.

Reducing Buffalo's Water Waste. Ma-

terial reduction of rate of 325 gallons per capita being effected by systematically locating and stopping leaks and wilful waste. 1 ill. 1,000 words. Municipal Journal. Sept. 20. 10 cts.

Akron Water Waste Survey Finds Loss in Large Meters. Isolation by sections at night to determine main leaks. Day tests for service leaks. Few underground leaks. 2 ill. 1,200 words. Engineering News-Record. Sept. 6. 15 cts.

Leakage from Vitrified Pipe Used to Convey Water Under Low Head. Abstract of paper by W. W. Brush. 2 ill. 2,500 words. Fire & Water Engineering. Sept. 12. 10 cts.

Use of Meters in Boston Metropolitan District. Consumption has been reduced 32% in 9 years. From a paper by S. E. Killam. 1 ill. 1,700 words. Municipal Journal. Sept. 27. 10 cts.

Pipe Lines:

Steel Pipe Line Covered with Concrete Without Disturbing Flow. By H. R. Case. 2 ill. 800 words. Engineering News-Record. Sept. 20. 15 cts.

Pumps:

Design and Constructional Features of Turbine Pumps. By A. E. L. Chorlton. 9 ill. 4,500 words. Canadian Engineer. Sept. 6. 15 cts.

Purification:

Decarbonation of Ground Water at Lowell. By F. A. Barbour, Consulting Engineer. 1,200 words. Fire & Water Engineering. Sept. 5. 10 cts.

Rates:

Municipal Works Rate Revision. Summary of and conclusion from the investigation of water rates made by City of Waltham. 1,200 words. Municipal Journal. Sept. 27. 10 cts.

Rate Revision in Municipal Work. Paper before the New Eng. W. W. Assn. By Bertram Brewer. 2,000 words. Municipal Journal. Sept. 20. 10 cts.

Reservoirs:

Cabbage Tree Creek Reservoir of Brisbane, Australia. 2 ill. 800 words. Engineering & Contracting. Sept. 12. 10 cts.

Design and Construction of a Reinforced Concrete Covered Reservoir. From a paper by H. F. Blomquist. 4 ill. 2,500 words. The Cement Era. Sept. 20 cts.

Reconstructing Compton Hill Reservoir. Waterproofing with asphalt. Cut off wall of interlocking steel sheet piling. Extending pipes of slope by concrete retaining wall. 3 ill. 4,000 words. Municipal Journal. Sept. 6. 10 cts.

Lansing Concrete Reservoirs. Novel details in design and construction methods. Distributing concrete without the use of tower and chutes. Beam and girder roof. By F. G. Gordon. 4 ill. 1,500 words. Municipal Journal. Sept. 6. 10 cts.

Societies:

Papers from the New England Water Works Assn. To-day's Problems in Water Works Management. By C. M. Saville; Meters Cut Waste in Metropolitan Water District. By Samuel E. Killam; Rapid Sand Filtration Holds World's Record. By George A. Johnson; Mechanical Filter Bottoms and Strainer Systems. By Robert Spurr Weston; Leadite Joints Saved \$2,800 on Single Contract. By Homer R. Turner. 6,000 words. Engineering News-Record. Sept. 20. 15 cts.

36th Annual Convention of the New England Waterworks Assn. 11 ill. 4,000 words. Fire & Water Engineering. Sept. 19. 10 cts.

Convention of the New England Water Works Association. Papers, discussions and other features of the 36th annual convention at Hartford are given fully. 11,000 words. Municipal Journal. Sept. 20. 10 cts.

New England Water Works Assn. Its steady growth in 35 years due to the efficient work of its officers. Big increase of membership during past two years brings the total up to 1,043. Places where past conventions were held and names of presidents. 1,500 words. Fire & Water Engineering. Sept. 5. 10 cts.

Thawing Mains:

Thawing Water Mains and Service Pipes. Describes the methods followed by the New York Edison Co., the Queens Co. Water Co. and the water departments in Columbus and St. Paul for freeing frozen service pipes and small distribution mains. 5,000 words. 3 ill. Fire & Water Engineering. Sept. 5. 10 cts.

Waterworks:

The Little Rock Water System. Report of National Board of Fire Underwriters. 1,200 words. Fire & Water Engineering. Sept. 12. 10 cts.

Hartford Waterworks. History of works, details of recent improvements, work at the reservoir, spillway details and seam grouting in foundation rock. From papers presented at the Convention of the New England Waterworks Assn. 1,500 words. Municipal Journal. Sept. 27. 10 cts.

New Jersey's Big Cantonment City Will Have Surface Water Supply. Fine sand and clay at Camp Dix an objection to wells. Pumping plant feeds three-mile force main. Both cast-iron and wood stave pipe are used. Many trenching machines are in service. By R. K. Tomlin, Jr. 11 ills. 2,200 words. Engineering News-Record. Sept. 6. 15 cts.

The Hartford Water Works. Description of the past and present works and of plans for the future. 8 ills. 5,000 words. Fire & Water Engineering. Sept. 5. 10 cts.

Water Works Statistics. Special report from many cities indicating source and kind of supply, number of reservoirs and pumps, type and capacity of filtration plant and giving information concerning mains, services, rates, expenses and income. 4 pages. Fire & Water Engineering. Sept. 5. 10 cts.

Waltham Water Works Notes. Preparing plans of system. Reducing waste by metering. Action of water on brass pipes. 1,000 words. Municipal Journal. Sept. 6. 10 cts.

Recent Improvement in Wilmington's Water Supply. Rapid filtration plant with turbine driven centrifugal pumps constructed to supplement slow sand filters. both will be operated side by side. New filters have a capacity of 12,000,000 gallons a day. By E. M. Hoopes, Jr., City Engineer. 6 ills. 5,500 words. Municipal Journal. Sept. 6. 10 cts.

Wells:
Large Well Sunk by Open Caisson Method. Open excavation inside concrete rings for 45-ft. deep well 25 feet in diameter. By C. B. Coe. 2 ills. 1,500 words. Engineering News-Record. Sept. 6. 15 cts.

LIGHTING AND POWER.

Lighting:

Street Lighting Poles and Lamp Supports. The third in a series of articles on street lighting for small cities and towns. An outline of equipment that has been found adaptable for small cities, residential and business sections with overhead and underground equipment. By James R. Cravath. 9 ills. 2,000 words. Electrical World. Sept. 15. 10 cts.

Lighting Streets in Residential Sections. General principles for observants in lamp spacing and location with overhead circuit under the conditions normally found to exist in small towns and cities. By J. R. Cravath. 9 ills. 2,200 words. Electrical World. Sept. 22. 10 cts.

Effect of the War on Street Lighting. Though prices are the highest in the history of the industry and the status of the bond market is not favorable for raising funds, the outlook is favorable. 2 ills. 1,000 words. Electrical Review. Sept. 1. 10 cts.

Lighting Standards in Rochester. How the standards are made. By R. W. Post. 4 ills. 500 words. Concrete Highway Magazine. September. 10 cts.

Floodlight From the Standpoint of Safety. 10 ills. 2,000 words. Safety Engineering. August. 25 cts.

Miscellaneous:

Notes on the Electric Storage Battery. 36 ills. 10,000 words. From a paper by E. W. Smith, Engineers' Club of Philadelphia. September. 35 cts.

Electricity in the National Army Cantonnments. 8 ills. 3,500 words. Electrical Review. Aug. 25. 10 cts.

Reducing Labor and Increasing Efficiency in the Boiler Room. By J. H. Edsall. 13 ills. 6,000 words. Electrical Review. Sept. 15. 10 cts.

The Importance of Scientific Feed-Water Regulation. By R. W. Andrews. 8 ills. 4,500 words. Electrical Review. Sept. 15. 10 cts.

Power Plants:

Unique Features of the New Power Plant at Murphysboro, Illinois. Electric, water and gas plant in a small city being reconstructed in a novel way. 1 ill. 1,250 words. Electrical Review. Sept. 8. 10 cts.

Unique Features of the New Power Plant at Murphysboro, Illinois. The second of two articles describing the reconstruction of a combination electric, water and gas plant in a small city. 7

ills., 1,700 words. Electrical Review. Sept. 15. 10 cts.

Data on Leading Steam-Electric Plants. Lists of principal equipment used in the most modern steam turbine driven electric generating station. 22 ills., 11 pages. Electrical Review. Sept. 15. 10 cts.

New Power House at Swift Rapids, Ont. Power development on Severn River. Details of machinery. 5 ills., 1,200 words. Canadian Engineer. Sept. 13. 15 cts.

FIRE.

Chiefs and Two Platoons. What heads of fire department say about working under new system. 800 words. Fireman's Herald. Sept. 15. 5 cts.

Platoons for Tacoma. 1,200 words. Fireman's Herald. Sept. 22. 5 cts.

San Diego Fire Service. Report of National Board of Fire Underwriters. 1,200 words. Fire & Water Engineering. Sept. 19. 10 cts.

To Check School Fire Hazards. New York Bureau of school buildings to introduce city-wide inspection to safeguard pupils. 800 words. Fireman's Herald. Sept. 8. 5 cts.

Fire Prevention and Inspection by Members of the Uniformed Force. By Thomas Davis, Chief, Victoria, B. C. 1,200 words. Fire & Water Engineering. Sept. 5. 10 cts.

Practical Hydraulics for Firemen. A series of articles by Fred Shepperd. 2 ills., 1,500 words. Fire & Water Engineering. Sept. 5. 10 cts. 2 ills., 2,500 words. Sept. 12. 10 cts. 8 ills., 1,400 words. Sept. 19. 10 cts.

MOTOR VEHICLES.

Table Shows Complete Average Operating Costs of Motor Trucks. By Ralph W. Horne. 800 words. Engineering News-Record. Sept. 20. 15 cts.

Motor Trucks in Portland. Details of operation. 350 words. Municipal Journal. Sept. 6. 10 cts.

Commercial Vehicle Problem in England. Fees to meet the expense of reconstructing road surfaces to carry the increased weight of commercial vehicles. 2,000 words. Good Roads. Sept. 8. 10 cts.

Tires for Motor Driven Fire Apparatus. From a paper by I. E. Davless. 2,000 words. Fire Protection. September. 15 cts.

Adapting the Motor Truck to its Work. 1 ill., 1,250 words. Cement & Engineering News. September. 20 cts.

Motor Truck Operations in Chicago. Mileage, work done and costs. 800 words. Municipal Journal. Sept. 27. 10 cts.

Aids To Fire Prevention for Motor Truck Owners. 1,000 words. Commercial Vehicle. Sept. 1. 20 cts.

STREET CLEANING AND REFUSE DISPOSAL.

Street Cleaning:

Comparative Costs of Street Sprinkling with Motor Trucks and Horse Drawn Tanks. Report from Los Angeles. 200 words. Engineering & Contracting. Sept. 5. 10 cts.

Missouri Cities Experiment With Vacuum Street Cleaners. Machines pick up street dirt and haul to dump. Center and gutter machines used. Streets must be dry. 2 ills. 1,000 words. Engineering News-Record. Sept. 6. 15 cts.

Street Cleaning Costs at Houston, Texas. 900 words. Engineering & Contracting. Sept. 5. 10 cts.

New Road Sweeping and Loading Machine. Description of an English invention. 2 ills. 1,500 words. The Surveyor. Aug. 17. 40 cts.

Waste Disposal:

Problems in Waste Disposal. The general lines that should be followed in designing a garbage reduction plant. From a paper by Henry Allen. 2 ills. 2,500 words. Canadian Engineer. Sept. 13. 15 cts.

Garbage Disposal by Incineration, Reduction and Feeding to Swine. Abstract of report of Springfield Bureau of Municipal Research on conditions in and recommending a method for that city. 3,000 words. Engineering & Contracting. Sept. 12. 10 cts.

BRIDGES.

Automatic Devices Reduce Manual Labor to Minimum on Concrete Bridge. From gravel banks in river bed to concrete in form, men merely direct machine. By V. H. Drufner. 4 ills. 1,000 words. The Contractor. Aug. 31. 10 cts.

New Details Found in Quebec Span Hoisting Arrangement. General scheme employed last year retained, but radically new bearings used. New and heavier links and more jacks. 6 ills. 3,000 words. Engineering News-Record. Sept. 27. 15 cts.

Quebec Suspended Span Successfully Hung from Cantilevers. 5,400-ton structure floated $3\frac{1}{2}$ miles on scows and hoisted 150 ft. by hydraulic jacks and lifting links. Work done entirely during daylight. By Harry Barker. 10 ills. 2,500 words. Engineering News-Record. Sept. 27. 15 cts.

Canadian Engineering has Triumphed at Quebec. Details of Quebec Bridge construction. 43 ills. 12,000 words. Canadian Engineer. Sept. 20. 15 cts.

Crane and Cableway Compete in Concrete Twin Bridges. Typical plants on adjoining contracts. Cableway less accurate and crane less rapid. 13 ills. 1,500 words. The Contractor. Sept. 14. 10 cts.

Culverts, Good and Bad. 2 ills. 1,200 words. Good Roads. Sept. 8. 10 cts.

Concrete Trestles Have I-Beams and Rails in Slabs. 3 ills. 1,500 words. Engineering News-Record. Sept. 27. 15 cts.

Gravity Mixer and Derricks Place Bridge Concrete. Balanced cable cars deliver concrete from gravity mixer to derricks hoisting to forms. 6 ills. 1,100 words. The Contractor. Aug. 31. 10 cts.

Economics of Bridge Design. From a lecture by J. A. L. Waddell. 6,000 words. Engineering & Contracting. Sept. 26. 10 cts.

Preferred Types of Bridges of Illinois State Division of Highways. Conditions for concrete bridges; for steel bridges; roadways. 900 words. Engineering & Contracting. Sept. 26. 10 cts.

Method of Handling Excessive Fall on Culvert Construction. 2 ills. 200 words. Engineering & Contracting. Sept. 26. 10 cts.

GOVERNMENT AND FINANCE.

New Housing Legislation of California. 1,000 words. Engineering & Contracting. Sept. 26. 10 cts.

Depreciation in the Value of Public Service Property. Advocates the use of common sense in determining present value. By A. S. B. Little. 5,500 words. Gas Age. Sept. 1. 20 cts.

MISCELLANEOUS.

Simple Cost Accounting System Adaptable to Many Classes of Construction. By B. R. Leed. 6 ills. 1,000 words. Engineering & Contracting. Sept. 19. 10 cts.

Sidewalk Coal Hole Cover Safety. By H. W. Mowery. 5 ills. 1,000 words. Safety Engineering. Aug. 25 cts.

Systematic Medical Care Reduces Sick Leave Costs. By Daniel J. Hauer. 1,500 words. The Contractor. Sept. 14. 10 cts.

Rapid Stadia Surveys Cover 50,000 Acres. Five-Man Parties Take Topography of Flood-control basin. Cost compared with other surveys. By L. R. Howson. 1 ill. 1,200 words. Engineering News-Record. Sept. 27. 15 cts.

Proposed Standard Methods for Measuring Concrete Work. Recommendations of Committee appointed by the American Concrete Institute. 3,000 words. Cement & Engineering News. Sept. 20 cts.

Sands and Consistency of Concrete. Results of tests for determining effects of sands and consistency and time of mix on strength of concrete. By L. M. Edwards. 2,200 words. Canadian Engineer. Sept. 6. 15 cts.

Using Old Concrete With New. How to use old concrete in street work and heavy masonry and save money in purchasing aggregate. 700 words. Cement Era. Sept. 20 cts.

500 Teams Save Day in Deep Mud at Camp Lee. 2 ills. 1,800 words. Engineering News-Record. Sept. 13. 15 cts.

Buildings Stepped to Fit Hillsides at Camp Gordon, Atlanta. Light army trucks used in construction. Road work. 6 ills. 1,600 words. Engineering News-Record. Sept. 13. 15 cts.

Diagrams Facilitate the Design of Concrete Forms. By A. Norman Laird. 6 ills. 1,250 words. Engineering News-Record. Sept. 6. 15 cts.

Logging Roads Carry Lumber to Each Brigade at Columbia Camp. Topography adapted to efficient distribution. 4 ills. 2,000 words. By H. D. Hammond. Engineering News-Record. Sept. 13. 15 cts.

The City of Hartford. Brief sketch of city, describing its government and improvements. 3 ills. 1,800 words. Fire & Water Engineering. Sept. 5. 10 cts.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Oct. 15-17.—SOUTHERN COMMERCIAL CONGRESS. Annual convention, New York, N. Y. Managing director, Clarence J. Owens, Southern Building, Washington, D. C.

Oct. 15-17.—NATIONAL HOUSING ASSOCIATION. Annual conference, Hotel La Salle, Chicago, Ill. Secretary, Lawrence Veiller, 105 East 22d St., New York City.

Oct. 15-17.—NATIONAL ASSOCIATION FOR STUDY AND PREVENTION OF INFANT MORTALITY. Annual meeting, Richmond, Va. Secretary, Gertrude B. Knipp, 1211 Cathedral street, Baltimore, Md.

Oct. 16-19.—LEAGUE OF KANSAS MUNICIPALITIES. Annual convention, Wichita, Kan. Secretary, Homer Talbot, University of Kansas, Lawrence, Kan.

Oct. 17-18.—LEAGUE OF MINNESOTA MUNICIPALITIES. Fifth annual convention, St. Cloud, Minn. Secretary-treasurer, Richard R. Price, University of Minnesota, Minneapolis.

Oct. 17-19.—AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting, Washington, D. C. Acting Secretary, A. W. Hedrick, 126 Massachusetts Avenue, Boston, Mass.

Oct. 17-24.—AUSTRALIAN TOWN PLANNING CONFERENCE AND EXHIBITION, Adelaide, Australia. Organizing director, Charles C. Reade, government town planner, Education Buildings, Adelaide, South Australia.

Oct. 22-24.—AMERICAN CIVIC ASSOCIATION. Annual meeting, St. Louis, Mo. Secretary, Richard B. Watrous, 914 Union Trust building, Washington, D. C.

Oct. 28-30.—TEXAS CONFERENCE ON SOCIAL WELFARE. Annual convention, Houston, Texas.

Nov. 13.—NATIONAL TAX ASSOCIATION. Annual conference, Atlanta, Ga. Secretary, Fred R. Fairchild, Yale University, New Haven, Conn.

Nov. 14-16.—FIRE MARSHALS ASSOCIATION OF NORTH AMERICA. Annual convention, New Orleans, La. Secretary, W. M. Campbell, New Orleans, La.

Nov. 15-16.—ASSOCIATION OF URBAN UNIVERSITIES. Annual meeting, Pittsburgh, Pa. Secretary, Frederick B. Robinson, City College, New York, N. Y.

Nov. 19-24.—CITY MANAGERS' ASSOCIATION. Annual meeting, Detroit, Mich. Secretary, W. L. Miller, City Manager, St. Augustine, Fla.

Nov. 20-21.—ASSOCIATION OF GOVERNMENTAL RESEARCH AGENCIES. Third annual meeting, Detroit, Mich. Secretary, C. O. Dustin, Statistical Bureau, Red Cross War Council, Washington, D. C.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress. Secretary, H. S. Braucher, 1 Madison Ave., New York, N. Y.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting, Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

Jan. 3, 4.—NEW JERSEY STATE LEAGUE OF MUNICIPALITIES. Annual convention, Trenton, N. J. Secretary, Clinton A. Swartz, Trenton, N. J.

Jan. 15-17.—VIRGINIA GOOD ROADS ASSOCIATION. Seventh annual convention, Richmond, Va. Secretary, C. B. Scott, Richmond, Va.

Feb. 6-13.—FIRST CHICAGO CEMENT MACHINERY AND BUILDING SHOW. Supersedes annual Chicago Cement Show. Held at the Coliseum, under direction of the National Exhibition Co.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE, Montevideo, Uruguay. Secretary, Edward N. Clonper, 105 East 22d Street, New York, N. Y.

Deeper Waterways Convention.

The tenth annual convention of this association will be held in Miami, Florida, November 27 to December 1, inclusive. An attractive program of business sessions, entertainments and outdoor events is being arranged for this "Thanksgiving Convention." There will be a motor boat pageant and races in Bay Biscayne, and an oyster roast with sports and sea-bathing at Miama Beach, one of the finest seaside resorts in America; an automobile trip on Tamiami Trail into the wonderful Everglades with their still "unreconstructed" population of Seminole Indians threading the waterways in their canoes; and other attractions, of which the announcement will be made later.

American Civic Association.

The American Civic Association will hold a convention in St. Louis, Mo., Oct. 22, 23 and 24. The program for the meeting is made public by the General Arrangements Committee, composed of representatives of the Chamber of Commerce, Civic League, Central Civic Council, Conference of Federations, Women's Federation of Clubs, Women's Council, West End Business Men's Association, North St. Louis Business Men's Association, Manufacturer's Association, Tenth Ward Improvement Association, Equal Suffrage League, the Junior Citizens and other organizations.

At the opening session addresses will be made by J. Horace McFarland of Harrisburg, Pa., president of the American Civic Association; Lieutenant-Governor Crossley, President Louis P. Aloe of the Board of Aldermen; John H. Gundlach, chairman of the General Arrangements Committee; J. Lionberger, president of the Chamber of Commerce, and Miss Jessie L. Moller, representing the women's organizations of the city.

In the afternoon there will be an industrial housing conference, at which the speakers will be Miss Ida M. Tarbell, the writer; Miss Margaret Walker Jordan of Fairmount, W. Va., and Harland P. Kelsey of Salem, Mass. The evening will be devoted to a local civic session, with Park Commissioner Cunliff, E. R. Kinsey, Harland Bartholomew and Mrs. George Gellhorn as speakers.

The Tuesday morning session will be a conference on small-town problems, with George B. Dealy, owner of the Dallas News, presiding. Among the speakers will be Harold A. Capron, a landscape architect of New York; George E. Kessler of St. Louis and J. C. Nichols of Kansas City. In the afternoon the delegates will be entertained with an automobile ride through the city and Forest Park, and a reception at the Art Museum under the direction of the Federation

of Women's Clubs. In the evening there will be an Ozark Park conference, with Enos Mills, the Colorado naturalist, as chief speaker.

The third day will be given up to conference on country planning and miscellaneous city problems. The visitors will be guests at noonday luncheons to be given by the Civic League on Monday, the opening day, at the City Club on Tuesday and at the Chamber of Commerce on Wednesday. The previous Sunday will be celebrated as "Civic Sunday" in the churches.

Southern Commercial Congress.

Six of the bureaus of the Department of Commerce will have exhibits at the Southern Commercial Congress, which is to be held in New York City at the Hotel Astor, October 15 to 17, 1917. In connection with the Southern Commercial Congress Convention the Southern States will hold an exhibit which will be adjoining that of the Commerce exhibit on the Belvedere Floor of the Astor. The Southern States exhibit will last from October 13 to 20, and it is the intention of the Department of Commerce to keep their exhibit intact during this period.

The subdivisions of the Department participating are, the Bureau of Foreign and Domestic Commerce, the Bureau of the Census, the Bureau of Fisheries, the Bureau of Lighthouses, the Steamboat-Inspection Service, and the Coast and Geodetic Survey.

The exhibit of the Bureau of Fisheries will deal largely with showing the work done in the past few years in developing new sea food, many species of which, heretofore unknown to the American public, have recently been placed on sale throughout the country as a result of the efforts of this Bureau. Samples of these new foods will be shown. In addition it will have a small exhibit of the pearl button industry of the Mississippi Valley; the utilization of skins of aquatic animals, showing finished leathers made from skins of the whale, porpoise, shark, sea elephant, etc. It will also have in its exhibit several of the instruments used by it in oceanographic investigations.

The exhibit of the Bureau of Foreign and Domestic Commerce will consist largely of a collection of cotton goods and wearing apparel from the Far East and South America; shoes from South America, Cuba, and the West Indies; unique implements used in various countries of the world; and possibly a large collection of general hardware supplies, and publications showing the work being done in foreign fields for the extension and up-building of American commerce.

The Bureau of the Census exhibit will mainly be charts and publications showing the different industries with the value of the products stated in quantities and dollars. It will have charts dealing with mortality statis-

tics, the locations of various large industries throughout the country, and a great deal of other material of a statistical nature.

The exhibit of the Bureau of Light-houses will, in part, include a universal flashing lens and lantern, similar to that in use along the Atlantic and Pacific coasts, which will be kept in motion and lighted. In addition to this will be shown the ordinary five-day lens lantern, and eight-day post lantern, which are used along our gulf and river shores, with various models of light vessels and light tenders; maps, drawings, models of different types of buoys; models of lighthouse tenders and lighthouses, etc.

The Steamboat-Inspection Service exhibit will be of particular interest at this time; and will be one of the largest at the exhibit. It will consist of instruments of all kinds used by the Service in the inspection of hulls, boilers, fire-fighting and life-saving equipments, with models of life boats, life rafts, line-carrying gun, rocket and outfit; life preservers, etc. It will also

have on exhibit condemned life preservers, fire equipment boiler plates, planking, etc. fusible plugs that failed to fuse one of which by its failure to fuse resulted in the death of 11 persons through the sinking of the steamship Jefferson. Publications, photographs, and statements will also be shown by the Bureau, in order to more clearly illustrate its work and functions.

The exhibit of the Coast and Geodetic Survey will consist largely of instruments used by the Survey in its work of surveying our coasts and placing of bench marks throughout the country. Some of these instruments are, a complete planetable alidade, and telemeter, chronographs, gimbal stand, geodetic level and rod, etc.

Special charts of the important harbors of the Atlantic and Gulf coasts will also be exhibited on screens.

Secretary of Commerce Redfield has designated the Chief Clerk of the Department, Dr. Geo. C. Havenner, to have general charge of the installation of the exhibit at the Astor.

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

The village of Lawrence, L. I., New York, is to make STREET IMPROVEMENTS. The consulting engineers for the work are Tribus & Massa.

Work is to begin at once on a new WATERWORKS SYSTEM for the city of Lockney, Tex. The consulting engineer is Henry Exall Elrod.

Minier, Ill., is to make a number of SEWERAGE IMPROVEMENTS. The engineers for the work are Melluish & Broynhill.

Little Rock, Ark., is making some STREET IMPROVEMENTS. The engineers for the work are Lund & Hill.

Oakland, Neb., is to construct a SEWERAGE SYSTEM. The engineer for the proposed improvement is P. A. Edquist.

Rainier, Ore., is contemplating the construction of a FILTRATION PLANT to cost about \$20,000. Plans and specifications for the improvement are being prepared by L. C. Kelsey.

The Monroe County Road Improvement District, Clarendon, Ark., is to construct 22 miles of ROADS and a number of concrete BRIDGES and culverts. The engineers planning these improvements are the Parkes Engineering Company.

The new WATER FILTRATION PLANT of Great Falls, Mont., has just been completed and the consulting engineers for the improvement, Burns & McDonnell, have submitted a final report on inspection and tests of the plant, which was found satisfactory and up to specifications.

STREET IMPROVEMENTS are to be made by Stanberry, Mo., plans and specifications for the work having been made by the firm of Black & Veatch.

A WATERWORKS SYSTEM is to be built by Waitsburg, Wash., at an estimated cost of \$50,000. The engineer retained to prepare plans is G. L. Sawyer.

WATERWORKS IMPROVEMENTS are proposed for the City of Brigham, Utah. Plans and specifications for the work are in process of preparation by H. S. Kleinschmidt.

A SEWAGE-DISPOSAL PLANT is proposed for Grand Rapids, Mich. The city has retained as consulting engineers to prepare plans the firm of Hoad & Decker.

SANITARY SEWERAGE SYSTEM is to be built by Pleasantville, N. J. Plans and specifications for the improvement have been completed by the engineers, Remington & Vosburg.

The Inter-River Drainage district, Poplar Bluff, Mo., is planning extensive DRAINAGE DEVELOPMENTS. Plans and specifications for the improvement, which is to cost about \$1,240,000, have been completed by the Morgan Engineering Company.

The Palo Verde Protection district, Blythe, Cal., is contemplating the construction of an extensive LEVEE SYSTEM to cost about \$1,000,000. The Federal Government is to be asked to contribute half and bonds for the remainder are to be voted on in December. The engineer retained to advise on the project is J. C. Allison.

Montana Municipal League.

The seventh annual meeting of the Montana Municipal League was held at Great Falls, September 7 and 8. The attendance at the initiatory meeting was light.

Alderman H. G. Bennet delivered the address of welcome. He reminded the gathering that the league was not in assembly for the purpose of pleasure, but for the serious business of solving various problems having to do with the operation of municipal districts in Montana.

(Continued on page 370.)

PERSONALS

Bowlby, Henry L., former state highway commissioner of Oregon, recently commissioned as captain in the engineer corps, has been ordered to report at Washington, D. C., for active duty.

Bunker, Capt. P. A., city forester and superintendent of parks of Fitchburg, Mass., has been ordered to report for active duty at Augusta, Ga.

Carraway, R. G., for the past two years district engineer with Henry E. Elrod, of Dallas, Texas, has been commissioned a first lieutenant in the Engineer Reserve Corps, and has been notified to report for active service at Fort Leavenworth.

Clarke, D. D., who has been chief engineer of the Portland, Oregon, water bureau for the past twenty years, has resigned. F. M. Randlett, who has been assisting Mr. Clarke, has been appointed to succeed him. Ben Morrow will succeed to the position formerly held by Mr. Randlett.

Gearhart, O. L., is resident engineer on the construction of concrete roads in Bureau county, Ill.

Goodman, F. R., has resigned as division engineer of the Arizona State Highway Department and has been appointed engineer for Coconino county.

Gum, Morgan T., formerly road engineer for Sussex County, Del., has been appointed to a position with the Delaware Highway Department. N. E. Hawkins has been appointed to succeed Mr. Gum.

Tefft, George H., has been made Secretary and General Manager of the Clay Products Association, a new organization which is an outgrowth of the International Clay Products Bureau, of which Mr. Tefft was secretary for eight years. During that time and for seven years previous he was secretary and sales manager for the W. S. Dickey Clay Manufacturing Co., but in the future will give his entire time to the Clay Products Association, the office of which will be at 912-914 Chamber of Commerce Bldg., Chicago, Ill.

Ulrich, R. E., assistant city engineer of Elkhart, Ind., has resigned to enter business.

Wheeler, Edward, Jr., fire marshal of Rochester, N. Y., died September 30.

Wood, William J., a member of the Indiana public service commission, died October 3 at Indianapolis.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

SANFORD TRUCK.

3½-Ton Machine of Strong Construction.

The motor of the model "35" 3½-ton Sanford truck is of the four-cylinder, "L" head type, 4½ x 6, cast en bloc. It has 3-point suspension. It is designed to develop 37½ hp. at 1,000 r. p. m. It is mounted so as to be readily accessible without removing from the frame. Ignition is by high tension magneto; carburetor, 1½-inch side outlet. Lubrication is by geared pump, force feed system. Cooling is by centrifugal water pump and steel fan.

The clutch is a Borg & Beck three-plate dry disk of large diameter attached to flywheel of motor and entirely enclosed by cast-iron housing, attached to bell housing of motor. The machine has four speeds forward and one reverse, with maximum reduction on low gear of approximately 5 to 1. Intermediate speeds are arranged in geometrical ratio. Connection between transmission and rear axle shafts is by means of two Spicer universal joints, with tubular drive shaft and splined slip joint. The universal joints are provided with grease covers to insure proper lubrication at all times and prevent dirt and dust from working into bearings. The gear shift lever is mounted in the center, and the gears are operated on selective principle. The fourth speed is direct drive. The drive is worm, of Sheldon make.

The emergency and service brakes are mounted on rear wheels, both being of the internal toggle, wrap-up type, 2½ inches wide and 20 inches in diameter. The brakes are enclosed, protecting them from oil and grit.

The frame is of pressed steel, side channels 8 inches deep. Pressed steel cross members are used at points where rigidity is desired. The springs

are semi-elliptic, front and rear, full alloy steel, properly heat-treated. The front springs are 3 inches wide and 46 inches long, and the rear ones 3½ inches wide and 54 inches long. A special type of spring hanging is provided on rear springs. The standard length of the wheel base is 174 inches. Chassis length back of seat is 12 feet, and chassis frame width, over all, 35 inches.

The wheels are heavy artillery type, with spokes mounted centrally in felloe. The rear wheels are of special construction to prevent water or dirt from working between spoke and felloe. The tires are, front, 36 x 5, single solid, and rear, 36 x 5, dual solid.

The speed of the motor is governed at 1,100 r. p. m., giving a truck speed of 13 miles an hour on high gear. The capacity of the truck, normal load, is 7,000 pounds; the maximum permissible weight on rear tires is 12,000 pounds, and on the front tires, 4,700 pounds.

The drawing on next page shows an "airplane view" of the chassis, and the photograph shows the truck itself. This recently developed machine is made by the Sanford Motor Truck Company, St. Mark's Avenue, Syracuse, N. Y.

PORTABLE OIL ENGINES AND PUMPING UNITS.

For Various Services on Construction Work.

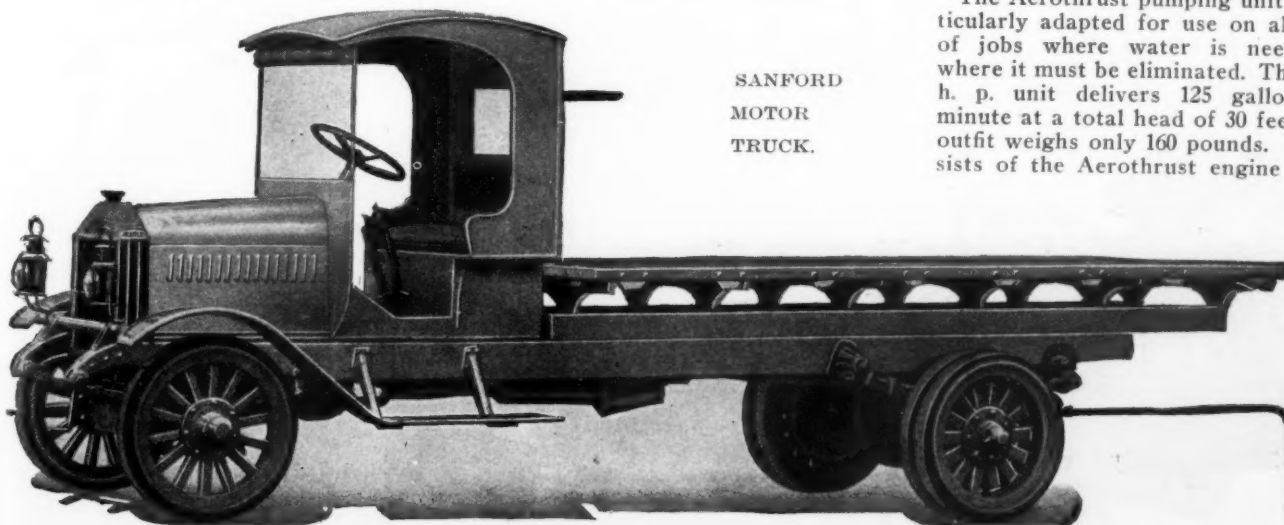
The Aerothrust line of engines is designed and built with particular emphasis on lightness and efficiency so that their service has proved very effective on construction work where portability and reliability are important. The engines are air-cooled, two-cycle, two-cylinder, opposed, and may be run on gasoline or kerosene. In

the design the heavy water jacket, water tank, large flywheel, cams and gears, necessary to the equipment of heavy water-cooled engines, are eliminated. The engine is made in three and five h. p. sizes, and is also furnished direct-connected to pumps, forming useful pumping outfits for contract work.

The three h. p. general utility engine weighs only 117 pounds. The lubricating oil is mixed with the fuel oil, thus eliminating cams and gears. The bore is 2½ inches and the stroke 2¼. The pistons are light cast iron, but strong. The crankshaft is forged in one piece from special steel. The crankshaft bearings are high-grade, die-cast removable babbitt bushings of liberal area. There is also a ball-thrust bearing to take the thrust of the propeller. The connecting rods are of highest grade nickel phosphor bronze. The carburetor is of the float feed type. Ignition is by jump spark system. The engine is cooled by means of fan blades in the flywheel, which is 14 inches in diameter, with a 2-inch face. The pulley, which is cast with the flywheel, is 3½ inches in diameter. The speeds are 900 to 1,800 v. p. m. The engine is equipped with high-tension, built-in flywheel magneto, Holley carburetor, Champion spark plugs, double manifold muffler and throttle governor. A two-compartment kerosene and gasoline fuel tank and a cast-iron base are provided.

The construction of the five h. p. engine is similar to that of the smaller one described. It weighs 145 pounds. The bore is 3 inches and the stroke 3½. The flywheel is 17 inches in diameter and has a 2-inch face. The pulley is 4 inches in diameter. The speed is 900 to 1,350 r. p. m. Cooling and other equipment is similar to that of the three h. p. engine.

The Aerothrust pumping unit is particularly adapted for use on all kinds of jobs where water is needed or where it must be eliminated. The three h. p. unit delivers 125 gallons per minute at a total head of 30 feet. The outfit weighs only 160 pounds. It consists of the Aerothrust engine direct-



SANFORD
MOTOR
TRUCK.

connected to a 2-inch centrifugal pump mounted on a light but strong base. It can be bolted down to any floor or may be mounted on two skids and easily carried around by two men. As the two cylinders fire at the same time, the engine is vibrationless and does not have to be held down at the job. The five h. p. outfit is of similar arrangement, a 3-inch centrifugal pump being used. The unit weighs only 250 pounds and is built to deliver 250 gallons per minute at a total head of 30 feet.

The accompanying illustrations show a three h. p. engine and one of the five h. p. pumping outfits. The machines are made by the Aerothrust Engine Company, La Porte, Ind.

INDUSTRIAL NEWS

Cast Iron Pipe.—The considerable drop in iron pipe prices of \$15 per ton on all sizes has been the result of the recent price regulation of iron ore, pig and finished products. Since the Federal regulations are effective until Jan. 1, 1918, no further decrease is expected until then. It is expected that cities will begin asking for bids for future needs. Quotations: Chicago, 4-inch, class B and heavier, \$53.50; 6-inch, \$50.50. New York, 4-inch, class B and heavier, \$53.50; 6-inch, \$50.50. Birmingham, 4-inch, class B and heavier, \$48; 6-inch, \$45; class A, \$1 extra.

Clay Products Association.

This association has recently been formed as an outgrowth of the International Clay Products Bureau, with the following officers: L. G. Blackmer, of Blackmer & Post Pipe Co., President; E. S. Hoyt, Red Wing Sewer Pipe Co., Vice-President; J. L. Scott, Macomb Sewer Pipe Works, Treasurer; George H. Tefft, Secretary and Manager; the headquarters will be at 912 Chamber of Commerce Bldg., Chicago, Ill.

Membership is limited to manufacturers of clay products in the United States and Canada, particularly vitrified salt glazed sanitary sewer pipe, segment sewer blocks, drain tile, vitrified wall coping and flue lining.

The association purposes to devise ways and means for promoting and extending the use of vitrified sewer pipe, segment blocks and other prod-

ucts manufactured by its members and for maintaining high standards in their manufacture. It will maintain complete testing, chemical and analytical laboratories and will be better able to co-operate with the American Society for Testing Materials than was the International Clay Products Bureau, the membership of which in that society will be continued by the new association. The association will also co-operate with the U. S. Public Health Service and with state and local boards of health for improving sanitary conditions. Also with fire prevention societies and the National Board of Fire Underwriters, with a view to bringing about better construction of buildings, especially chimneys, by the use of fire clay flue lining. It has offered to the U. S. Government the service of its engineers to encourage the drainage of wet and superirrigated lands. It will cooperate with the traffic bureaus of railroads in endeavors to improve methods of loading, unloading and transporting clay products and securing freight rates that are just and equitable to railroads, manufacturers, and consumers. It also will carry on an active and vigorous campaign in conjunction with good roads periodicals for the better drainage of wagon roads and the construction of hard surfaced wagon roads.

About thirty of the principal manufacturers are charter members of the association and it is expected that within a few months all of the manufacturers of the materials named above will join the association and assist in a publicity and a promotion campaign that will include not only engineers and dealers, but also consumers. Its endeavor will be to create good will for the future as well as for the present.

The Asbestos Protected Metal Company, Pittsburgh, Pa., announces the appointment of Ole K. Olsen, 822 Perdido Street, New Orleans, as sales agent for the state of Louisiana and the southern portion of Mississippi.

The Macleod Company, 2232-2236 Bogen Street, Cincinnati, Ohio, in order to take care of its rapidly expanding business, has been compelled to enlarge its plant and to increase its

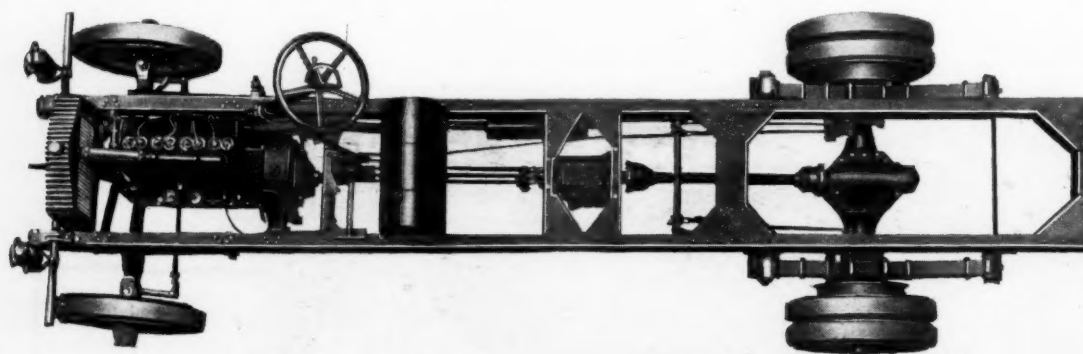
capital to \$100,000. The company has been established for over twenty years and its trade has extended to a great many industries of the United States and foreign countries. The chief products made by the company have been sand blast equipment and metallurgical furnaces.

The American-La France Fire Engine Co., Inc., Elmira, N. Y., announces the receipt of the following orders: Butte, Mont., 1 type 40 chemical engine—Cherokee, Iowa, 1 type 40 combination with Junior pump—Fergus Falls, Minn., 1 type 75 combination with Junior pump—Gloversville, N. Y., 1 type 40 combination with Junior pump—Lebanon, Tenn., 1 type 40 pumping engine—Long Branch, N. J., 1 type 75 chemical with Junior pump—Martin's Ferry, Ohio, 1 type 31 55 ft. serial truck—Monticello, Cal., 1 type 75 combination with Junior pump—Pottstown, Pa., 1 type 17 tractor—Reading, Pa., 1 type 75 pumping engine—Tyrone, Pa., 1 type 14 service truck—Vin Del Mar, Chile, 1 type 40 combination with Junior pump—West Hoboken, N. J., 1 type 31 truck tractor—Winters, Cal., 1 special pump engine—York, Pa., 2 type 12 pumping engines—East Las Vegas, N. M., 1 Brockway type B combination; Elwood, Ind., 1 Brockway hose car—Glenwood Springs, Colo., 1 Brockway type B combination—Lancaster, N. Y., 1 Brockway type B combination—Lincoln, Ill., 1 Brockway type B combination—Middleton, Pa., 1 Brockway type B combination—Port Huron, Mich., 1 Brockway type B combination—Reading, Pa., 1 Brockway type B combination—Toms River, N. J., Brockway type B hose car.

Standardization of U. S. Army Truck.

The Secretary of War has made the following statement: "The designing of the new standard military truck, which must meet the field transportation problem of modern warfare, has been completed. A sample chassis, representing the efforts of approximately two score truck specialists, will be ready by the middle of October, and final tests will be conducted. Deliveries are expected to begin in January, within four months after the War Department undertook the development of the truck.

After a series of conferences between



TOP
VIEW
OF
SANFORD
TRUCK
CHASSIS.

military and civilian engineers the design of the standard truck was completed early in September. Within 10 days detailed drawings were made and sample parts ordered. Ordinarily it requires several months to perfect and turn out such parts, but various manufacturers patriotically agreed to put ahead the Government's work, and delivery of the parts, it is now expected, will be made by October 1. The crankshaft die was sunk in seven days, and the crankcase pattern and first casting were made five days after receipt of the drawings.

It is believed the new standard motor truck will fully meet the requirements of the Army in the field. Rapidity of manufacture, stability, and standardization are the outstanding promises of the new truck.

In July the Quartermaster Corps initiated the movement for the production of a standardized military truck that would be an improvement over commercial designs heretofore used. Cooperation of truck manufacturers in all parts of the country was promised at a meeting held in Columbus in July. Early in August about 50 truck specialists and engineers of established reputation came to Washington at the invitation of the Quartermaster Corps. The Society of Automotive Engineers, which is assisting the Government on engineering problems, also sponsored the Washington conferences.

Both manufacturers and engineers generously contributed trade secrets in the designing of the military truck, just as they did in the development of the aviation engine. Engineers believe the new truck, a composite of the best there is in all commercial trucks, will be several years in advance of anything yet produced. Manufacture of the new truck will be carried on under direction of the Quartermaster Corps and the automotive committee of the Council of National Defense. Mr. Christian Gird, who has resigned as president of the Standard Parts Co. to undertake the work, has been se-

lected by Col. Chauncey Baker directly to supervise the work of production.

The new military truck will be made in two models, class A and class B. The engine used in the two will be the same in design, except for slight differences in cylinder bore, pistons, piston parts, and riggings. To a large degree interchangeability of parts will be possible. The class A model will have a normal carrying capacity, under the arbitrary official ruling, of 1½ tons, with an actual commercial capacity of 3 tons. The class B truck will have a normal capacity of 3 tons and an actual capacity of 5 tons. Both trucks will have a two-wheel drive, with a speed requirement of 14 miles per hour for the class A trucks and 12 miles for class B trucks.

It is planned that the first orders for the trucks shall call for 10,000 vehicles, to be delivered in the first six months of 1918. These orders will call for 10,000 class B and 5,000 class A trucks. The adaptability of the new trucks to commercial as well as military uses is indicated by arrangements now being made by a number of manufacturers to produce them for commercial purposes.

NEWS OF THE SOCIETIES

(Continued from page 369.)

One of the reports of most interest given during the first day of the convention was made by W. B. Sands, of Chinook, whose subject was "Taxation and Assessment." Briefly summed up, Mr. Sands said he wanted the mines to pay a tax on profits instead of valuation.

At the second day's morning session papers were read and discussions heard concerning street paving. There was considerable time devoted to debate on the storm sewer question, L. B. Evensen, of Great Falls, leading. Mr. Evensen was asked many pertinent questions relating to the operation of storm sewers in Great Falls.

Taking up the question proper of street paving, A. C. Birkland, of Lewistown, talked briefly concerning this issue. He condemned the prevalent practice of cities permitting contractors to virtually draw up their own bonds. Mr. Birkland suggested that the league select two or three lawyers versed in municipal laws to meet with the Montana Engineers' Association at the next session of that body to help devise ways and means to attain the objects he outlined. He urged,

also, the cooperation of all city attorneys in the matter of this standardization. Mr. Birkland presented a form of this sort, now in vogue in Lewistown, and suggested that it might contain some hints that would be helpful to all concerned.

E. M. Sneckenberger followed, dwelling at length upon the matter of maintenance of pavement and measures relating to payment therefor. He discussed the various methods employed in making assessments, and recommended more flexibility along these lines.

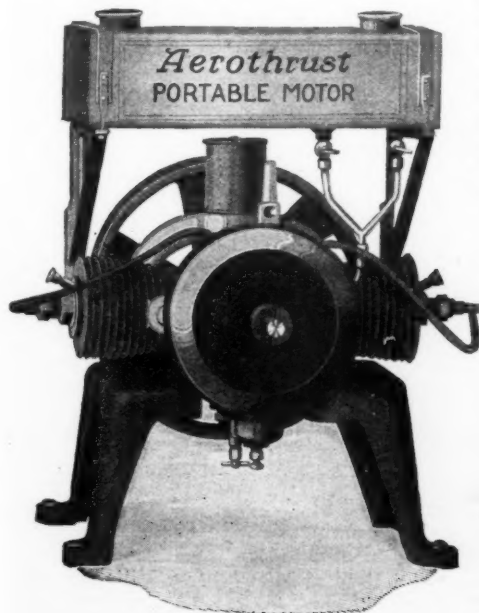
L. B. Evensen submitted a lengthy paper on the paving subject, dealing with the various types of surfacing, street width, drainage, pitch to be used in various section of all cities, and the proportions to be used in mixing to arrive at a perfect pavement. He said, in part:

"The purpose of this paper is to deal with pavements laid in this city and to show the advantages and disadvantages of each kind under its particular service, to show the necessity of design and foresight in the construction of a modern city. A perfect pavement has not as yet been constructed, although if everything were true that is said about pavements by some promoters there would be no reason for reconstruction in after years nor any need of constant study of conditions to bring about better results in paving. The engineer must be able to select with reasonable foresight the kind of pavement best suited for the location in which it is to be placed. No engineer, no matter what experience he has had, is a prophet, even if some people think he ought to be, nor should he be condemned if he make a few miscalculations when he is continually hampered by lack of funds with which to carry on improvements.

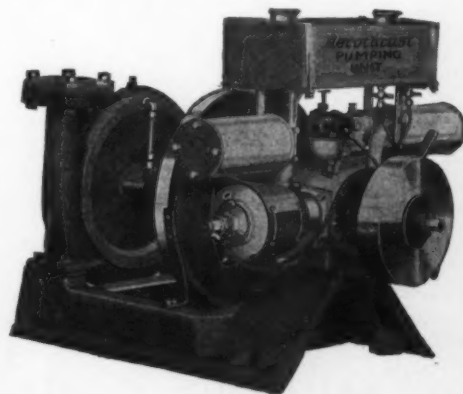
"For convenience the subject under consideration can be divided into the following heads:

- "1—Pavement for residence street.
- "2—Pavement for residence street with street railway.
- "3—Pavement for business property.
- "4—Pavement for business property with street railway.
- "5—Pavement for wholesale district.
- "6—Alley paving.
- "7—Strips leading into the city."

In his address following Mr. Mitchell's talk on city planning, R. E. Mc-



3-H.P. AEROTHRUST
PORTABLE ENGINE AND
5-H.P. AEROTHRUST PORTABLE
ENGINE, DIRECT-CONNECTED
TO CENTRIFUGAL PUMP.



Donnell of Kansas City said the saddest word on the city planning subject was "too late." He told of an expenditure of \$600,000 required to be made by the municipality of Kansas City for the widening of one street two blocks. He urged Montana towns to start now planning for the future. He told the leaguers that the best thing Kansas City had ever done in the way of civic improvements was the expending of \$16,000,000 in the past twenty years on public parks. Mr. McDonnell averred that the installation of these parks had enhanced property twofold. He also announced that Kansas City had adopted a plan of wider radia in the business district, thus providing more room in which to turn traffic.

E. C. Horsky of Helena, following along the lines of city planning, urged the league to do its best to bring about improved finance conditions for cities. He condemned the present drift, which forces more of the building and occupation of tenements and apartments, to the detriment of the home with the yard and garden. He attributed this, however, to excessive taxation, declaring that this made building too expensive for the average man, who found it cheaper to live in a rented place or a tenement.

Robert Pauline, mayor of Kalispell, submitted a paper dealing with the question of paving. Mr. Pauline was unable to attend the meeting, and the report was read by the clerk. The statement dealt with types of paving, surfacing, subgrades, etc.

The afternoon meeting of the league was devoted entirely to discussions of municipal questions, reports and the annual selection of officers and an annual gathering place. The election was made the first duty of the body, and at the conclusion of the business session a convention place was selected, Helena being chosen on account of legislative assembly being in session at that time.

In addition to choosing a meeting place the association selected officers for the ensuing year. Those who will serve in official capacities are: N. A. Ward, Butte, president; W. M. Johnson, Billings, first vice-president; H. W. Brown, Cascade, second vice-president; W. H. Harrison, Great Falls, third vice-president. H. L. Fitton, of Lewistown, was renamed secretary-treasurer of the league. Mr. Fitton served in this capacity last year.

The question of remuneration for the secretary-treasurer was discussed and a decision was reached to pay that official the sum of \$100 annually for his services.

Edward Horsky led a discussion on municipal ownership of municipal utility plants. This subject proved of interest to all those gathered, and many participated in the debate. All were in favor of cities owning their own utilities and operating the same, except for one or two isolated instances, where it was suggested that small towns like Belt and Cascade might not be able to conduct all their

enterprises, such as lighting systems, for themselves. H. W. Brown, Frank Ploutnik, Dominic Spogen and W. M. Johnson participated in the discussion.

C. C. Widener of Bozeman led the debate concerning waterworks and was helped along by R. E. McDonnell of Kansas City, W. H. Lawrence of Kalispell, A. L. Badeon of Dillon, and others.

Dominic Spogen of Belt spoke briefly on the question of public parks, and told his hearers that the town of Belt had bought and paid for a 24-acre tract of natural woodland, which was used as its municipal playground and park.

The main feature of the evening was a lecture upon water and filtration plants, their construction, operation and benefits, by R. E. McDonnell of Kansas City. Mr. McDonnell, who designed the Great Falls filtration plant, illustrated his talk by stereopticon views, showing the Great Falls plant as well as those at St. Louis, Billings, Miles City, Oklahoma City and other

points. He also threw upon the screen charts showing the great reduction in deaths and cases of typhoid fever in the various cities following the installation of filtration plants. He advocated the adoption of the meter system of water sales.

Citizens' Street Traffic Committee of Greater New York.

At a meeting of the executive committee, held Sept. 26, the date for the annual meeting was set for Oct. 10 at 7 p. m., at the Automobile Club of America. The committee recommended a change in the name of the organization to "The Street Traffic Association of New York State."

League of Iowa Municipalities.

The twentieth annual convention of the League of Iowa Municipalities was held at Iowa City, Sept. 19-21. At the final morning session the city of Ames was selected as the meeting place for the next annual convention and the following officers were elected to serve for the coming year: president, T. A. Potter, of Mason City; vice-presidents, W. R. Law, Waterloo; W. B. Snyder, of Council Bluffs, J. F. Ford, of Fort Dodge, and H. K. Stebbins, of Iowa City.

The first afternoon session was combined with the sessions of the health officers' short course of lectures being put on by the Iowa university. Dean D. O. McGovney, of the college of law, gave a very able address on the legal aspects of health administration. This lecture was designed to assist health officers to understand their duties and powers under the law and to know what co-operation to expect and demand from other officers.

President W. A. Biering, of the state board of health, gave an address touching upon the relations of the state board of health to the local boards of health. This address, too, was designed for the benefit of the local health officers in order that they may better understand their powers and duties.

M. G. Lloyd, of the federal bureau of standards, Washington, D. C., gave a short address on the relations of the bureau of standards to the municipality.

The second day of the short course for Iowa health officers began Thursday morning with a paper by Dr. G. R. Roudiger, health commissioner of LaSalle, Ill. An address by Dr. D. B. Armstrong, director of tuberculosis control demonstration of Farmington, Mass., occupied the second part of the program. Dr. A. W. Freeman also spoke before the assembly on the control of poliomyelitis.

In the afternoon Dr. Steindler, professor of surgery of the college of medicine, concluded a clinic in the study of "Orthopedic Relief of Poliomyelitis," in the surgical amphitheater of the university hospital. Dr. Freeman conducted a meeting later on "The Sanitation of Iowa Villages and Farms."

MUNICIPAL INDEX

(Continued from page 368.)

Sand and Gravel Digger Designed and Built for Ohio River. Machine to raise concrete aggregate from stream bed for use in locks and dams. Equipment produces 800 cu. yds. in 8-hour day. By A. W. Kreamer, Jr., Engr. 4 ills. 2,200 words. Engineering News-Record Sept. 13. 15 cts.

Contracting from an Engineering Perspective. By H. W. Hatton. 1,700 words. Cement Era. Sept. 20 cts.

Building Up an Engineering Organization. The qualities that a man must have to fill a particular job. Discovering these qualifications. By A. E. Morgan, Chf. Engr., Miami Conservancy District. 1,250 words. Engineering News-Record. Sept. 20. 15 cts.

A Method of Determining the Apparent Specific Gravity of Fine Aggregate. 700 words. Engineering & Contracting. Sept. 5. 10 cts.

Economical Proportions for Portland Cement Mortars and Concretes. From a paper by J. A. Kitts. 3,000 words. Engineering & Contracting. Sept. 5. 10 cts. 4 ills.

Contracting on a Modern Basis. How concrete construction must be carried on under modern ideas of management. 1,000 words. The Cement Era. Sept. 20 cts.

How the Progress of a Big Construction Job was Scheduled. Description of progress chart used on a recent job by the Aberthaw Construction Co. 1 ill. 1,100 words. Cement Era. Sept. 20 cts.

Concrete Plant has Novel Way of Handling Cement. Delivered from shed to mixer by gravity tramway. By W. S. Tait. 1 ill. 1,000 words. Engineering News-Record. Sept. 6. 15 cts.

Design and Construction Features of New Buildings of South Park Commissioners of Chicago 4 ills. 1,100 words. Engineering & Contracting. Sept. 26. 10 cts.

No Promise of Lucrative Practice Made to Engineering Students. Engineering schools, in reply to questionnaire, report marked demand for young graduates in all branches and some general increase in pay. 4,000 words. Engineering News-Record. Sept. 13. 15 cts.

Railway Practice in Steam Shovel Operation. Report of the American Railway Engineering Assn. on steam shovel operation. 1,500 words. Engineering & Contracting. Sept. 19. 10 cts.

What is the Trouble with Concrete in Sea Water? The first of a series of articles on the deterioration of concrete in sea water. By Rudolph J. Wig and L. R. Ferguson. 3 ills. 2,500 words. Engineering News-Record. Sept. 20. 15 cts.

Handling and Measuring Bulk Cement. Is not dusty to handle and may be loaded direct from car to mixers or by dump wagons, dump-body trucks or industrial railways. 1,100 words. Cement Era. Sept. 20 cts.